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October's Mad Moon

By ARCHIBALD RUTLEDGE

Illustrations by R. Bruce Horsfall

THE "MAD MOON" the Indians called the moon of October; and as was the case with most of their other beliefs, they had a good reason for it. For October is likely to be a month of radical changes, both visible and invisible; and these changes have their effects on the behavior of the wild creatures that the Redmen knew so familiarly and observed so keenly. They noted, in October, that many birds and animals begin to "act up." They behave as they never do at any other time of the year. They literally seem possessed. Bucks lose half their wariness and dread of man, are seen abroad in full daylight, and manifest a nonchalance and a truculence not at all in keeping with their wonted shyness. Grouse fly incontinently, hurtling against houses, crashing through windowpanes, appearing suddenly in places far from their haunts. Coveys of quail literally come to town, and are seen in gardens and along streets. Tame ducks and geese, uttering strangely wild cries, rise and fly for several hundred yards. " 'Tis a mad world, my masters," said the poet. " 'Tis the mad month," said the American Indian, "and the madness is due to the moonlight."

While it is true that the word *lunatic* comes directly from the Latin *luna,* the moon; and while there has long been a superstition that any one sleeping in the moonlight will be affected mentally, there seems no reason to credit the belief, and certainly no reason to attribute to October moonlight an especial balefulness. Having considered carefully the phenomena of autumnal "madness" of wild creatures, phenomena that unquestionably are genuine, it seems to me possible to account for their erratic behavior in a natural manner. After nearly a half-century of observation, as nearly as I can judge, birds and animals never have moon-madness; but they do have love-madness and migration-madness. These two emotional upsets probably account for all the vagaries displayed; and the fact that these two seasons come, for many creatures, during the mellow moonlight of early autumn, is a mere coincidence.

Perhaps it has never been definitely stated that the impulse behind the autumnal migration is by no means the same as the impulse behind the vernal. The southward movement in the fall is distinctly one of self-preservation. It is an escape, perhaps not so much from actual cold as from the cutting off by winter of an adequate food supply. It is a matter of life or death, this urgent business of reaching a more genial clime. But in the spring the migration is primarily a romantic journey. It is then that to the heart of life the voice of love is calling. Mating is the motive for the springtime epic flight. Of course, there may be a kind of homesickness behind the movement, and a feeling that certain places are better than others for nesting and for rearing children. But the primary impulse is amatory, and that is not true of the autumnal hegira.

Let us look first at the urge to migrate that apparently seizes all birds, both wild and tame, when October comes. It seems fair to say that, in general, those accustomed to migrate, do so; those which do not migrate go through an emotional crisis. Consider, for example, that superb

"THERE HE STOOD IN ALL HIS TAILOR-MADE TRIMNESS AND IRIDESCENT BEAUTY."

patrician, the ruffed grouse. He never migrates. But quite conceivably his ancestors did. For must not all northern birds have migrated in the Ice Ages? The non-migrants do not accept their situation calmly. They rebel; and they make manifest their protest in the irregularity of their behavior. One October I flushed a grouse a full three miles from its mountain home.

As strange a thing as ever happened to me occurred late one autumn afternoon while I was driving in my car up an old deserted lane. On either side the banks were high, and the wire fences on top were smothered by honeysuckle and greenbriars. At the time of this singular adventure I was more than four miles from any human habitation. One of my sons was with me, and we were starting for a hike in the mountains.

Suddenly in the lane ahead of us appeared, out of nowhere, a fine wild gobbler. There he stood in all his tailor-made trimness and iridescent beauty. Whence he had come, who could tell? As is well known, a wild turkey is not afraid of a car; hence I was not surprised that this bird let us drive right up to him. I stopped the car within twenty yards of him while he still stood there in gleaming beauty. The blue head, the gorgeous plumage, the pink legs, but above all the slender symmetry of his body—all these proclaimed him a genuine wild turkey.

"Isn't he a beauty?" I whispered.

The turkey evidently heard and saw me, and I expected him to fly; but instead he made a little dodging run up the left bank. Knowing that there he would run into the honeysuckle-camouflaged wire fence, I said quickly, "Son, see if you can catch him!"

My boy was out of the car in an instant and, dashing up the bank, so startled the turkey that he ducked into the honeysuckle and against the fence. In another two minutes we had an eighteen-pound wild gobbler in our car—a perfect specimen that we brought home and tried to tame. But it took a long time, as he kept violently flying against the wire of his pen. Ordinary barnyard food he refused; but when some sumac and bittersweet berries were hung against the inside of his wire, he at length deigned to taste them fastidiously.

This curious experience has always made me believe that even wild turkeys have the urge to migrate, or at least to wander far in autumn; hence the presence of this solitary bird, miles from his mountain home. Moreover, at such a time, whether from weariness of travel or a certain mental bewilderment, wild things may appear to have lost the edge of their keenness. They appear to be thinking of something other than their own safety. For once, self-preservation, instead of driving the car, is sitting in the rumble-seat. I have long observed that non-migrants are far more erratic in their behavior in autumn than migrants. In some dim way perhaps they feel as people do who, blizzard-bound in the North, are compelled to look at pictures of bathing beauties on the Florida sands. It "gets" them.

For some years I assisted the Pennsylvania State Game Commission in distributing Mexican quail. The birds arrived in good condition; they took kindly to their new habitat; they nested and reared their young. But early in October, with the coming of the first frost, and three weeks before the hunting season began, these fine birds, undisturbed and apparently happy, simply vanished. There is no question but that they migrated, and my guess is that they spent Thanksgiving south of the Rio Grande. Even our native quail become exceedingly restless in migrating time. In an autumn twilight I have seen a covey of these beautiful birds rise undisturbed from the cover in which they and their forebears were born, climb the sky to a considerable height, and then head southward. Perhaps they went only half a mile, perhaps ten; but clearly they were acting on instinct, which told them that it would be wise for them to move. Quail never migrate in the accepted sense; but I have known them to fly great distances. Where I live, it is their regular habit to desert the valleys in the autumn for winter quarters, several miles away, among the laurel thickets on the mountains. There several coveys may be asso-

"QUAIL NEVER MIGRATE IN THE ACCEPTED SENSE; BUT I HAVE KNOWN THEM TO FLY GREAT DISTANCES."

ciated; and in the kalmias, at a time when there was deep snow on the ground, I have come upon as many as sixty of these fine birds in one colony. When spring arrives, they troop back into the valley to pair off and to mate.

For foxes, wildcats, skunks, weasels, and the wild whitetail deer, autumn or winter is the breeding time. Of these animals the one that makes his activity most known is the skunk; and his presence is heralded not to the country dweller alone but also to most of those who drive the highways. Other animals likewise are abroad in the darkness, but only to the skunk has Nature given a long-wave broadcasting system.

Foxes and wildcats and weasels are commonly abroad only during the night; but in the mating season they may be seen at any time of day, and often in places that they visit at no other time. Because it is unusual at any other season, it is strange to see a red fox traveling along through the woods in full sunlight, unpursued. If it is a female, it may be escaping temporarily a male admirer; if it is a male, he may be following a mate, or in search of one.

But because of his beauty and the romance of the wilds always attaching to him, no other animal is so interesting in its mating habits as the whitetail deer, the love season of which begins before the mad moon of October, and may extend into December, and even into January, depending on the age of the deer and on the latitude of their habitat.

The love-life of some people is far less interesting than is that of many mere creatures. To be definite, the love-life of the deer is more fascinating by far than is the tawdry romance of people whom Kipling describes as being of the "beefy face and grubby hand" (not to mention beefy heart) variety. In all temperate latitudes the whitetail deer—and the rest of his great family—falls in love when the harvest moon sheds its gold-and-silver glory over the autumnal landscape.

This most romantic of wild courtships begins at the close of a long separation—a parting evidently arranged by Nature. In December and January the bucks and does separate; this is at the end of the mating season. In the deepest thickets the does immure themselves; and for company they are drawn to one another. Droves of twelve or fifteen does may often be seen in midwinter in good deer-country. The bucks, dropping their antlers, become timid solitaries; and until the late summer, when their new horns begin to harden, they live to themselves. Two old bucks will sometimes consort—possibly more. Meanwhile, the does, from April to August or September, are busy with the exacting and peremptory cares of motherhood, leaving them no time for any social activities.

This separation of the does and bucks appears to be one of those marvelous provisions of Nature whereby the species is continued. "Journeys end in lovers' meetings" is true here, as always and everywhere. But I have come to be persuaded, through long years of observation, that there is, during the fawns' infancy, another reason than the apparent one for the segregation of the sexes. The reason is that the bucks would probably kill the fawns if they had their hard horns when the fawns came.

As has been said, the bucks shed their old antlers as soon as the mating season is passed. Bucks that are the most physically fit will carry theirs longest, just as bucks that are at the zenith of their physical powers will wear the kingliest crowns. By the first of March all the bucks are butt-headed. But no sooner has the old set of horns dropped than the new horns, a most wonderful growth, exquisitely sensitive, begin to bud. When the does drop their fawns, in April and in May, the bucks, their new antlers their chief concern, are timidly retired. They are eager to avoid company. At such a time, were their horns hard and sharp, many would be the helpless fawns impaled upon them; for the normal buck has a truculent temper. In the character of the buck at different seasons we observe Dr. Jekyl and Mr. Hyde. Throughout the mating season he is combative, treacherous, merciless among his kind; yet at that time when his offspring would be defenseless before him, he is shy and fugitive. Has not Nature wrought with a subtle hand in this remarkable arrangement? She has merely provided that the bucks be excluded from the nursery.

By late August, the stags, their horns full-grown and fast hardening, begin to rub off the velvet. At such a time, the death and drying-up of this strange hairy skin-sheath of the antlers causes intense itching, which is the exciting force for the cleaning and the polishing of the new horns. It is early in the mating season that antlers are sharpest, brightest, most polished. The wildwood knights are now eager for their forest-tournaments, upon the outcome of which will depend what might be termed their social standing in the deer community.

The whitetail commonly has a very limited range; he loves home. But during October and November he ranges far and rather incontinently. I have known him to swim at that time, though unpursued, a salt bay three miles wide. I have known more than one buck from the remote solitudes of the Santee Club to wander nine miles to my plantation. Wherever they are hunted, deer, unless disturbed, will not be seen abroad except at daybreak and at twilight. But during the Mad Moon season, they travel around in broad daylight, lose much of their natural caution, and at times actually attack man. Keepers of deer parks always have to be wary of bucks in the autumn; and I have several authentic instances of a big buck on my own plantation refusing to give ground when approached by Negro children on their way to school. He did not actually charge them, but he threateningly lowered his head with its great antlers. At no other time of year will a deer so behave.

The Indians, in watching the migrating hosts of the autumn, probably did not know, as we do, of their winter homes and of their summer homes, and more than likely ascribed the marvelous pageant to some occult power. In the sense that instinct is deeper than reason and often more infallible, and that in a real sense it may be considered an occult power, we and the Indians are not far apart in our inclination to wonder at the great recessional of Nature, in bringing with it, along with the change of season, changes of character and behavior.

Buried Treasure

By G. DUNSFORD KLEIN

SURPRISES are awaiting the observer at every turn—in the woods, down among the grasses and weeds of the summer meadow, along the country highways and sideroads where tangles of vines, bushes and weeds grow in profusion beside the rail-fence and stone-wall. Everywhere Nature is concealing little mysteries, waiting for someone with prying eyes to enjoy them.

My curiosity was rewarded one warm summer day as I was returning home after a long, tiring walk. I paused for a time to rest on a stump that was covered with dank moss and mould. As I sat there a rustling of leaves attracted my attention. A diligent look around on the leafy forest floor failed to disclose the maker of those curious rustlings. Several times I was sure that I had found the spot from which the noises came, only to be disappointed, but each time I was spurred on in the search by the mystery of it all. Then, quite by accident, I saw something move on the ground right in front of me, and out into the open came Mr. and Mrs. Tumblebug, preceded by their precious charge—a small ball of manure.

I found their labor very interesting, although I confess I could see no object in it. They had struggled through the leaves and now had a fair stretch of open ground ahead. Mr. Tumblebug helped the ball along, at times almost standing on his head and pushing with his hind legs, while it was Mrs. Tumblebug (I found out later) who helped and sometimes hindered by mounting the ball and crawling far out to help pull it forward with her hind legs. This bit of terrain they traversed with no mishap, until at the edge of the clearing they encountered a barrier in the form of a windblown twig. It was here that I saw a display of tumblebug perseverance. One pulled, the other pushed, but to no avail. Finally, after a short parley, they both pushed their heads under the ball and over it went into the leaves. It was not long, however, before they were again out in the open, pushing and pulling—always trying to keep

"THEY ENCOUNTERED A BARRIER IN THE FORM OF A WINDBLOWN TWIG"

the ball rolling, and not seeming to care in which direction it went.

What was this all about? A few days later I found the answer. There was an egg laid away in the mass, and all of this expeditious labor went to find a suitable place to bury it. The egg inside would soon hatch and the larva literally eat itself out of house and home. There was enough food to last it until full growth, when it would transform into a pupa and finally to an adult tumblebug. The time would soon arrive for it to work its way to the surface and come into the outside world where it would go its amusing way in the barnyard, scurrying for cover into some dark, damp place, or falling into the cow tracks down in the pasture where one might see it on its back waving its funny legs in the air while trying to right itself, and, of course, it will struggle along with its priceless sphere of manure, in time to come, just as its parents did.

Protective Resemblance in Nature

By H. H. PITTMAN

Photographs copyrighted by the author

IN THE fields and woods things are not always what they seem, and we find that the existence of many wild creatures depends largely upon their ability to look like something else. This phase of the struggle for life is called "protective resemblance" and the term, whether understood or not, must be familiar to everyone. Briefly, protective resemblance is the name generally used for those cases where an animal resembles an inanimate object and, by virtue of this, becomes more or less inconspicuous. Although closely allied, it is distinct from mimicry, in which an entirely different end is achieved and, of course, is a decided step ahead of the commoner protective coloration.

Protective coloration can be seen everywhere, from the white winter fox of the Arctic regions to the brown hares of the plains and it was probably an early step in the evolution of the wild creatures we know today. Most mammals benefit by it, with the exception of a few that have developed other defenses that time and trial have proved effective. Protective resemblance, however, goes further and often is the only defense of non-aggressive creatures that otherwise might have died out.

Some of the best examples of protective resemblance occur among insects, and what may be called the classical illustration is afforded by the leaf-butterflies of northern India and the Malayan region. I have a beautiful specimen from Assam and have seen equally fine ones from the Andaman Islands. Among moths, the handsome buff-tip of Europe, *Pygaera bucephala,* often is referred to. Most of the larger museums devote space to this interesting branch of natural history and explain by means of specimens among natural surroundings the reasons for the different colors and markings with which we are familiar and which serve so well for protection.

AN EXPERIENCED EYE IS NEEDED
These two insects, although they may be sitting right under your nose, are difficult to find because of their protective resemblance. Pictured on this page are a Saskatchewan moth and the ash hawk moth

So many of the most outstanding instances of protective resemblance are illustrated by tropical specimens that the casual observer is inclined to regard the phenomenon as an occurrence peculiar only to the tropics. For this reason it is interesting to find new or at least unexpected examples for ourselves in the gardens and fields close at hand. Cases of this peculiarly effective method of escaping unwelcome observation are not uncommon on the western prairies and probably new ones will be discovered as field naturalists become more numerous. Field work is essential if one is to understand and appreciate the many variations of form and color that in a museum sometimes seem so meaningless.

The most perfect instance of protective resemblance I know of in Saskatchewan is provided by the moth *Lithomoia solidaginis* that flies in September and early October. It is an insect of weathered or neutral colors that would harmonize with almost any natural object or surface upon which it might alight in the autumn. In a collection it is uninteresting and hardly worth noticing.

During life, however, this moth is more interesting, for in its normal resting position it so closely resembles the stub of a broken

branch that even an experienced entomologist might pass hundreds without suspecting their presence. In repose, the rather long narrow wings are closely wrapped around the body, and a little depression in a stick, such as that left when a branch is broken off, often is chosen as a resting place. In such a spot the moth places its head and then, with its back to the ground, holds its body out from the support at an angle of approximately thirty degrees, about the normal angle at which many branches leave the main stem. I have seen one of these moths standing on end deliberately searching for a hollow, as if it knew that in such a place it would be inconspicuous. However, I once found a fine specimen on a weather-beaten board, where it stood out quite noticeably. In the resting places generally chosen this moth is so perfectly disguised that the closest examination is necessary to distinguish it from its surroundings.

THIS IS NOT A LEAF

But a resting leaf butterfly of Assam. The undersides exactly resemble dead leaves, complete to the mid-ribs and veining

The large ash hawk-moth, *Sphinx chersis,* of Manitoba, also resembles a natural growth when resting. It is a handsome grayish insect and sleeps upon gray, lichen-clad dead branches where its neutral colors and elongated wings clasping the support make it look like part of the wood. I passed the dry stick shown in the photograph several times before I realized that the swelling on one side was really a resting moth.

These two moths show the development of protective resemblance in different degrees. With the stick-moth the deception is much more elaborate, but both seem equally effective. There are many other instances, such as the yellow crab-spiders that look so much like the pea-shaped galls on the leaves of the willows, and the slender caterpillars so hard to distinguish from twigs. A careful observer can find examples of protective resemblance almost anywhere, from the distant wild places to his own orchard or garden. I chose these from Saskatchewan to show that even the windswept prairies afford opportunities to follow the interesting bypaths of entomology. They are neither remote nor academic and the beginner has as much chance as the specialist to discover something new.

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Leave Them in the Wild

By MAURICE J. RONAYNE

Wild-flowers in vases look to me
  Like children in captivity;
Was it for this the patient earth
  Labored and wept to give them birth?

Think you it matters not to them
  When blossoms from the parent stem
Are plucked and gathered in bouquets,
  Or left to languish in a vase?

"That's what flowers are for," you'll say,
  And yet the humblest woodland spray
Seems happier to me by far
  Than orchids in a porcelain jar.

And for my part I'd rather see
  Plain buttercups beneath a tree;
Or daisies deep in meadow-grass,
  Than roses sorrowing in glass.

Then leave the aster with its brook;
  The primrose in its pasture nook;
Nor part the sprightly daffodil
  From gay companions on a hill.

Leave them with sun, and wind, and sky;
  What can they want with you and I?
Drink of their beauty deep—then go,
  Leave them for other hearts to know.

Mexico—Land of the Cactuses

By E. C. HUMMEL

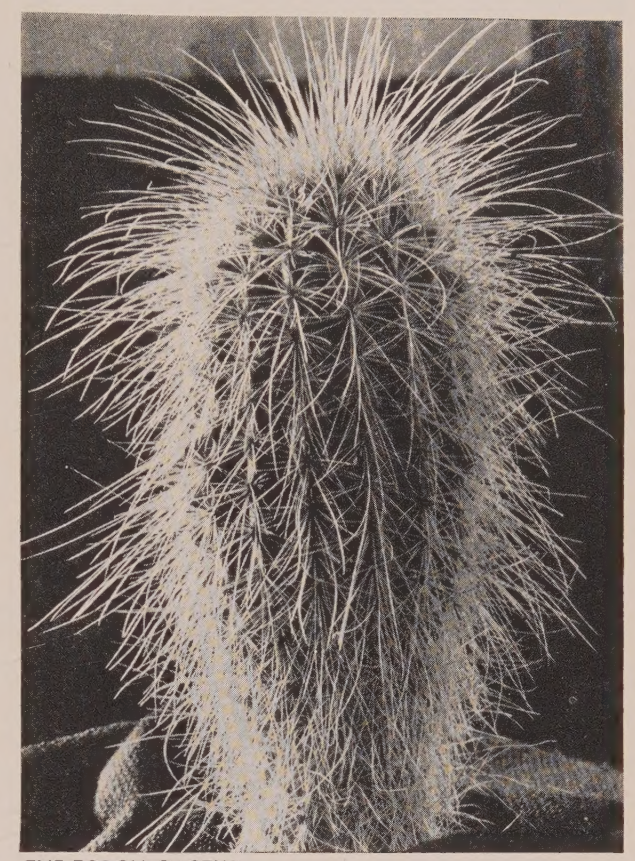
Photographs by the Author

FROM Mexico come many of the most interesting and unique species of the Cactaceae. Many of these have been discovered only recently. Looking over the forms of various species, we realize there seems to be no limit to what may yet await the interested traveler who is willing to chance the hardships and make expenditures for further exploration.

One of the comparatively new discoveries is *Mamillaria hahniana,* known as the Old Lady of Mexico. This was discovered in 1929 in Central Mexico, where it grows in large clusters, completely cloaked in long, fine hair. During the blooming season it wears a crown of dainty pink or rose flowers that makes it a thing of great beauty. Little less conspicuous is the crown of red berries that is later pushed from between the flowering tubercles, to remain for weeks like a crown of rubies on a white-haired lady.

One of the most difficult plants to locate is *Roseocactus kotschubeyanus,* which belongs to the living rock group of the Cactaceae. On account of the shape of its tubercles it carries the common name of deer-foot cactus. It has a large tuberous root and the entire plant is sunken entirely in the ground. Here it is safe from the eyes of the collector until blooming time, when the large pink flowers that arise from the center disclose its presence.

Cephalocereus hoppenstedtii is one of the rarer of the old man group. It is also referred to as one of the torch cactuses, as it takes very little imagination to make it such, when moonlight or late sunlight finds a reflector in the mass of beautiful white spines. In its natural habitat it reaches a height of ten meters; in collections it is usually found as small or medium-sized plants, raised from seed.

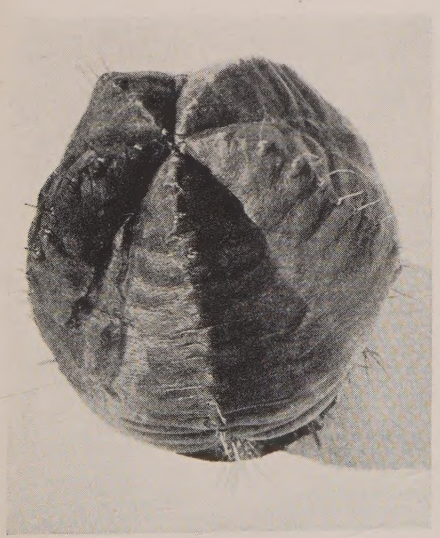


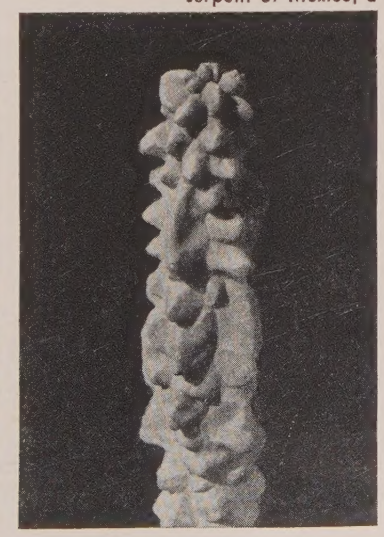
THE TORCH CACTUS
This member of the cactus family gets its name from its spines, particularly beautiful when reflecting the light of the full moon

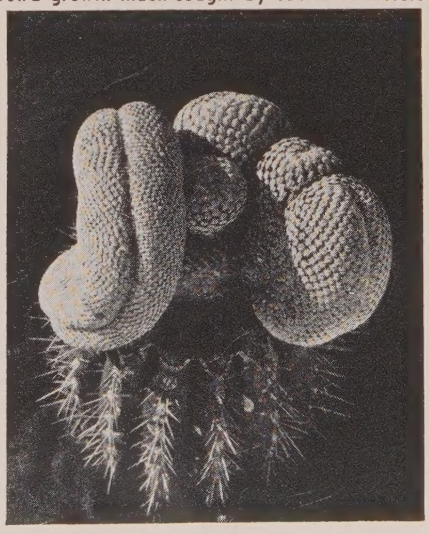
Echinocereus knippelianus, the green tomato cactus, is one of the freaks of the hedgehog group. Unlike its sisters in this genera, it is almost entirely devoid of spines and is flabby in texture. It produces delicate pink flowers that arise from the ribs midway on the plant.

Not less fascinating than these normal forms are the strange shapes produced when something goes wrong

AT FIRST GLANCE, THE LAYMAN WOULD NOT THINK OF THESE AS CACTUSES
However, pictured in the usual order are the green tomato cactus, so called because of its resemblance to our garden vegetable; the totem pole cactus, just recently discovered; and the white serpent of Mexico, a weird growth much sought by cactus collectors







A NEW DISCOVERY AND A RARE SPECIES

The "Old Lady of Mexico" was recently discovered in central Mexico where it grows in large clusters, completely cloaked in long, fine hair. The deer-foot cactus, which belongs to the living rock group, is one of the most difficult to find

with Nature's control of growth. We are all familiar with *Celosia cristata,* the beautiful red cockscomb found in many gardens. This has been developed through many years of selection and is propagated from seed. In cactuses such forms are especially interesting. While the cause of this phenomenon is a controversial subject, scientists agree that in certain cases it is hereditary. Some authorities believe injury to the growing center to be the cause. Such a mishap may possibly arise from injuries by lightning or insects or in other ways. Another theory is the presence of borers or fungi within the plant that may cause excretions that in turn cause the monstrous growths. Whatever the cause, collectors are sometimes fortunate enough to come upon these twisted, snake-like plants that are in great demand by cactus fanciers. Today in green-houses may be found as many as one hundred and fifty different species in this form, one of the most beautiful being *Solisia pectinata cristata,* commonly called the white serpent of Mexico. In the center of the photograph may be seen the normal form, which rarely attains a breadth of more than three centimeters, but a continuous growth of the crested plant may reach fifteen centimeters across. The normal form is often necessary for the identification of the species. The rapidity of growth compared with the normal form is another inexplicable feature of these plants.

Another of the most grotesque and interesting forms, *Lophocereus schottii monstrosus,* or the totem pole cactus, was discovered in 1932. Its correct identification is still in doubt, as no entirely normal branches have ever been found on the abnormal species. On account of its proximity in nature to *Lophocereus schottii,* and the fact that for short spaces in its growth it seems inclined to take on the form of the latter, it has tentatively been identified as a variety of that plant. Resembling a carelessly-carved totem pole of green soap-like appearance, it is a marvel to all who see it. Only two small colonies, both in Lower California, have been found.

If it is variety of form or flower you seek in pot plants, you cannot afford to overlook the possibilities of this large family. Due consideration must be given to the fact that while an experienced cactus nurseryman may be able to remove bodily a plant from its native home, transplant it to an open garden or glass-house, and, by the most careful culture imaginable, be able to nurse it into a healthy specimen, you may not be so fortunate. My contention is that it would be of great help to the popularity of this group, as conservatory or window plants, if the conservationists could control the collecting of native species. The romance of having plants collected to your order is obvious, but a check of those same plants would disclose that the average lives only a few short weeks, and leaves the purchaser quite discouraged. Acclimatized seedlings or plants grafted to a stock that is hardy under diverse conditions are most satisfactory and are now obtainable. Mexico has stringent laws concerning the exportation of certain species. With modern methods of propagation from the smallest seedling or plant parts, it is unnecessary and undesirable to permit practices that may endanger the perpetuation of these rare and wonderful plants of the desert.

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Too long absent from our pages, we welcome John Lindsey Blackford back next month. This young Montana naturalist and writer turns his facile pen and keen powers of observation to a story of fascinating incidents of the wild that makes habitation walls seem prison-like.

Geological Wonders of Saratoga Springs

By ANNA McNEIL

Uncredited photographs by the author

ONE of the most fascinating books that Nature has written in her series on "The Marvels of the Universe" deals with the geological wonders of Saratoga Springs, the city of northern New York publicized the year around for its mineral waters. Yet, while thousands of visitors drink freely of the state-owned springs, few inquire about their origin, and the story remains hidden in dusty documents or in little-read volumes on library shelves.

Millions upon millions of years ago the mountain chains were rent asunder, leaving a 350-mile depression extending from the St. Lawrence region to New York Bay. The highest point in this valley, which is between Fort Edward and Fort Ann, near and to the north of Saratoga, is only 147 feet above sea level. At Schenectady, twenty miles southward a similar depression runs westward, drained by the canalized Mohawk River that once carried the waters of the Great Lakes to the sea in a mad descent over two tremendous cataracts, the remains of which are still visible at Little Falls and at Cohoes. Natural highways were thus formed over which man has traveled for thousands of years. Thirty-eight different carriers have been used in commerce and pleasure upon the Mohawk and Hudson Rivers and along their shores, from crude Indian dugout to motor barge.

The first inhabitants of these picturesque and historic valleys, who probably lived at the same time as the mastodon, are believed to have been of Eskimo stock. The skeletal remains of one of these mastodons were found almost intact a few decades ago in a pot-hole beneath a fill of fifty feet while workmen were excavating for the foundation of a textile mill at Cohoes.

Saratoga, of course, is an Indian name and was applied to one of the favorite hunting and fishing grounds located on either side of the Hudson and extending for many miles in all directions. Several meanings have been ascribed to the word. One is that it means the "hillside country of the great river"; another, "the place of the swift water," in allusion to the rapids just above Schuylerville; a third, "the place where the track of the heel shows," from depressions resembling heel prints in certain rocks; and perhaps most probable, "the place of herrings," because of the great number of these fishes that swim to the outlet of Saratoga Lake and thence into the lake itself in the spring of the year. The fish weirs that the Indians constructed were the source of much strife between the Iroquois and Algonquins.

Saratoga has been variously spelled Cheratoge, Sarachtitoge, Sarachtoga, Saractoga, Saraghtoga, Saragtoga, Saratoge, Saraktoga, Sarastague, Sarastaugue,

OLD MAN SARATOGA
This is one of the queer rock formations that can be found in the Petrified Gardens at Saratoga Springs

PHOTOGRAPH BY JOSEPH GURTLER

A FORMER SEA-BOTTOM
A young explorer examines the strange formations over which once rolled the waves of the ocean

THE PETRIFIED LIONS OF SARATOGA SPRINGS

So called from their resemblance to the jungle king, these formations are composed of primitive plants that have been entombed half a billion years in stone

Schorachtoge, Sarasteau, Saraston, Saratogo, Sarrantau, Serachtague, Seraghtoga and Soraghtoga.

The Indians have known of the medicinal value of Saratoga's springs since time immemorial. In the winter of 1777 or 1778, General Philip Schuyler, one of the heroes of the Revolution, moved to Saratoga with his family. He had heard of the health-giving properties of a spring in the wilderness a dozen miles west of his new home and personally investigated. As a result, he was so convinced of its merits that he determined to cut a road from his residence through the forests to "High Rock" as the spring was then known. This he did in 1783 at his own expense, and so to this great Colonial character belongs the honor of building the first highway by which the public could reach the healing waters.

A million years is but a moment of geological time. The Saratoga region, in ages past, was covered by successive ice sheets that extended down from Labrador. The glaciers interrupted the drainage, caused considerable erosion and left the area cumbered with glacial deposits. When the last ice sheet retreated, bodies of standing water were left in the Hudson and Champlain valleys south of the ice. The altitude was so much lower than it is now that the Champlain valley and the valley of the St. Lawrence up to Lake Ontario were below sea level and held marine waters.

A glacial boulder fifteen feet high is a conspicuous object, like a monument shaft on a drumlin, which is an oval-shaped hill of glacial drift, three miles west of Saratoga. It is unusual for a glacier to leave anything so upstanding and striking as this.

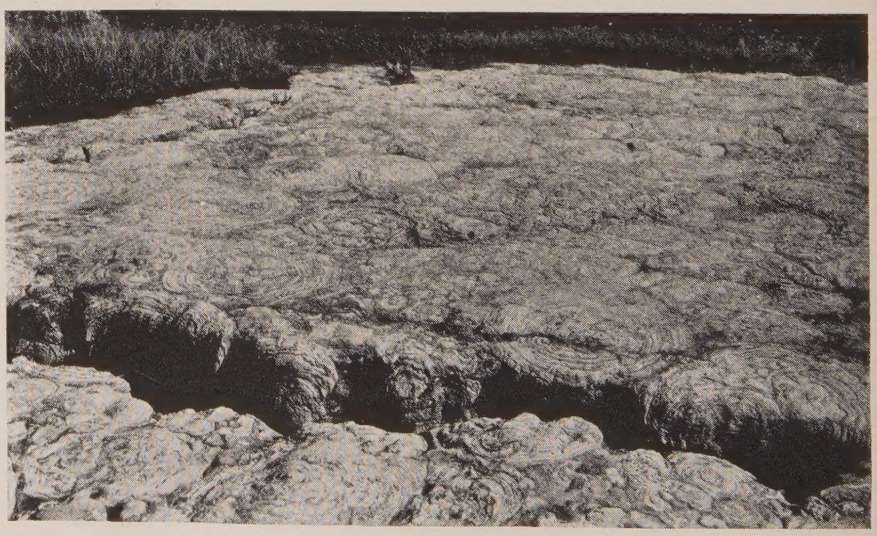
The mineral springs at one time made Saratoga the foremost summer resort on the continent. Even without the saline springs, Saratoga would have been famed for its sulphur waters, which rise from the black shales at no great distance below the surface. The taste is due to decomposition of the pyrite in the shales. Springs without number are doubtless imprisoned throughout the entire region. Only a few months ago a resident of Ballston, ten miles south of Saratoga, finding the water system of his home inadequate, drilled a well on the premises for an additional supply. Water gushed to the surface smelling and tasting so strongly of sulphur that it could not be used for household purposes.

Geologists agree that the saline springs belong to a great underground water circulation in natural equilibrium, inflow and outflow being equal, and that there is no grave danger of exhausting the quantity. The springs supposedly have a common source in the mountain territory to the east. Pressure is supplied by a great natural generating station so deeply situated in the earth that terrific heat causes metamorphism of the limestones. This would account for the presence of carbonic acid and the salinity of the water may be attributed to its contact with the original sea water deposited ages ago in the rocks and still retained in their depths.

The springs occur on or near the surface trace of the Saratoga fault, for a stretch of twelve known miles. Little Falls dolomite is the name of the rock that constitutes the vast storage basin. Dolomite is not a porous rock, generally speaking, and the waters rise through cracks and fissures up through Amsterdam limestone of the upper Black River age, which overlies the dolomite,

A "BONE DRY" SEA

Eons have passed since the ocean covered this area, but this table rock is known as the Great Reef in the Petrified Sea Gardens



PHOTOGRAPH BY H. B. SETTLE.

and finally through a relatively thin cover of shale to the surface. The original springs are natural outlets of the rock waters; others have been reached through drilling. The formations slope to successively greater depths, and at Mechanicville a well was sunk fourteen hundred feet through the shales without reaching the imprisoned waters. Hathorn spring, on the outskirts of Saratoga, comes from a depth of 1006 feet.

The waters contain carbon dioxide, sodium chloride, calcium, magnesium, and sodium bicarbonate, and are almost entirely lacking in sulphates. Their varying degree of mineralization suggests that in the last stages of their underground journey they become diluted with fresh surface water.

Compared with Saratoga's geological age it is less than a second of time since the red man cupped his hands at the bubbling spring in the forest. Now, as the medicinal waters "gush forth for the healing of the nations," they are under the control of the State and a superb group of public buildings houses them.

Dr. Franz Maximilian Groedel is the authority for the statement that the value of the springs is due to the carbon dioxide that, bubbling through the waters, bursts against the skin, massaging certain nerves. Stimulated nerves dilate the blood vessels. Some of the gas is absorbed into the tissues and acts on the superficial capillaries, causing them to fill. The skin reddens and the increased flow of blood benefits because it relieves the internal organs of congestion. Respiration is stimulated also and increased breathing enables the lungs to ventilate faster, which is beneficial in certain heart ailments.

Half a billion years ago, activity of an entirely different nature was centered in the Saratoga region, of which the fascinating Petrified Sea Gardens, three miles west of the present city, give mute evidence. In the warm, shallow waters of the long-vanished Cambrian sea, dating back to early Paleozoic time, great colonies of cryptozoon plants, ancestors of the familiar algae of today, flourished. There were no fish in the waters; no animals upon the land. The streams that flowed into the sea from the lowlands of Adirondackia had little current, and carried practically no sediment into the clear, still waters to choke and destroy the algae growths. Just below the surface, and at low tide, thousands of clumps of this earliest and lowest form of vegetation were exposed.

The algae secreted lime, and the structures they built resembled stone cabbages; small, in the beginning; showing nodules, like bulbs growing in a saucer, at midstage; flattened and oval-shaped when completed and old. These, the first apartment houses, were only partly occupied by living forms, for the inner and lower portions became the tombs of the builders and their offspring constructed new cells of stone on the upper surface, over the crypts of their ancestors. The plants that formed the cryptozoon masses are believed to have been blue-green in color, as this type was the first to appear. The common algae of today, growing freely in water and in damp places, may also be green, brown or red.

Tiny crustaceans, known as trilobites, quite similar in appearance to crayfishes and shrimps, fed upon the algae. Their delicate remains, broken by the action of the water, are found among the clumps. Thick, bulbous seaweeds are also present.

Three species of cryptozoons lived in the ancient sea. The first is called *Cryptozoon proliferum* and the reef shows a thickness of eighteen inches. A terrific land disturbance took place and the tranquil Cambrian waters were suddenly invaded with a rush of sediment that brought quick destruction to the algae and the thin-armored trilobites.

A second form, *Cryptozoon ruedemanni,* appeared in the course of time, following the cabbage style of architecture like its predecessors, having rather regular concentric layers and growing to masses two to three feet across. Geologists read in its clumps the story of a rising land surface and of sand grains washed down by waters whipped into action by gigantic forces.

With the disappearance of the second form through changing earth conditions, the youngest member of the cryptozoon family, known as *Cryptozoon undulatum,* appeared. It grew in thin layers, the lower ones being parallel, but soon becoming undulating. The summer cottage of Mr. and Mrs. Robert R. Ritchie, owners of the Sea Garden, is built upon these strata, overlooking a beautiful perennial garden.

A peculiarity of the stone cabbages is that they have been cut in two, revealing the internal structure. The last ice-sheet, undershod with rocks that acted like the teeth of a gigantic file, planed off the upper portions, leaving a comparatively smooth surface. The Sea Gardens cover thirty acres. They were discovered when a farmer's plough scraped off the surface of soil.

In addition to the marvelous stone formations, a section of Saratoga's ancient fault line can be plainly seen. The earth's surface cracked under severe strain, and displacement, one side either fallen or risen, occurred along the line of the fracture. Displacements may be gradual or sudden, and if sudden result in an earthquake.

Still other phenomena are the wide, deep crevices in the exposed limestones known as joint-planes. These have the same origin as the faults but are fractures of the surface without displacement. In this instance they were probably the result of tension, as the sea bottom became elevated into a land area and the limestones underwent a drying process. The joint planes in the Petrified Gardens have been widened much more than usual by the storms of centuries. Limestone is soluble in water and the beating rains have widened the joints by the same process that builds great caverns.

There are numerous pot-holes that began as saucer-shaped depressions in the rocks. Sand and gravel lodged where the surface was slightly uneven or hollowed and turbulent waters caused the particles to swirl until the sharp edges began a cutting action.

There are few other spots on earth where, within the limits of a few miles, the geological wonders are so numerous and outstanding. The geology of this region has helped materially to make the history of the continent.

ADOPTING NATURE'S CHILDREN

The wildflower garden may mean conservation or destruction

By MARY CARPENTER KELLEY

Photographs by the Author

JACK-IN-THE-PULPIT AND PITCHER PLANT
These two transplanted wild flowers grew and blossomed in a galvanized iron tub garden

Is it conservation to remove wild flowers and ferns from their habitats in order to grow them in artificial surroundings? This question is often discussed at garden club meetings and is one that is frequently asked the conservation committee. The word "conservation," according to Webster, means "a keeping in a safe or entire state," so the answer depends on whether the person who takes wild plants home means to keep, or does keep, them in a safe or entire state.

There are too many people, alas, who take up plants in the woods and meadows with every intention of making them grow in a new environment but who take no pains at all to reproduce the conditions in which the plants were found. These are the folk whose transplanted wildings wither and die, and to whom "conservation" should be defined as "letting entirely alone."

I do not class myself with them, for the inmates of my wildflower garden are both "safe and entire." They are a joy to themselves as well as to my friends and me, and I believe that in being able to show rare plants to visitors, and to tell them that these things should be left undisturbed unless native surroundings can be closely approximated, I am teaching conservation in a real manner.

My wildflower garden consists of three parts, a sheltered corner facing south with semi-shade, a small bog in full sunlight, and a watery bog in the shade. Whenever I go for a walk in the country I take along a basket filled with strawberry boxes, paper bags and a trowel. When I come upon a plant I want for my garden, I take it up and put it in one of the boxes. Then I fill a bag with earth from the spot in which the plant was growing. When I get home I select the proper place for the newcomer: corner, sunny bog, or wet location. I dig out enough soil to accommodate the plant's roots and after supper I tuck the stranger into bed, pull his own clothes up over him, give him a drink of water and tell him I'll see him in the morning. Next day he always is as pert and contented as if he had never been moved, and, as if grateful for a change of scenery, continues to grow, producing new leaves or blossoms in prodigal fashion.

Blue and white hepaticas blossom in April against a background of last season's Christmas ferns that are still green but a little shabby. In fact, hepatica's own leaves, so well shaped and handsomely marked with bronze in the fall, are now rather the

FERNS AND BLOODROOT
A bit of the wild woods transported to the author's garden without loss of plants and as a lesson in flower conservation

worse for wear, so that her furry buds and delicate flowers seem all the more fragile in contrast. She has not finished blooming when the fuzzy crosiers of the lady fern hump themselves up through the ground between her and the wall, and the blunt spears of the bloodroot force themselves into the foreground, a whole army of them. Almost overnight the small, folded, round leaves open enough to allow the white blossoms to emerge, giving no hint of the great size they will attain before the summer is over.

HEPATICAS GREW WELL

Several colors were safely dug up and planted in friendly soil in the garden of wild flowers

Before the snowy petals of the bloodroot whiten the ground, there are several trilliums in sight, and what a time they have straightening up, shaking the wrinkles out of their folded leaves and getting their pale yellow, greenish-white and rose-colored petals smooth and shapely! These are not the ordinary Maine red, or white, or painted trilliums, but a rather rare variety that grows in just one place near the shores of Shaker Pond where a brook with steep banks gives them the proper amount of water and sunshine. Yet, for all of their being so choosy, they have taken a shine to my corner.

Yellow violets are next, and then come the round white buttons of the mandrake, their umbrella-like leaves folded cleverly around the one waxy-white blossom at their base. If you have never watched the marvelous opening of their pale green parasols that are so soon lifted, you have missed one of the rarest sights in plant life. One advantage in having these plants growing in your own yard is that you have the opportunity to watch development from the first appearance above ground to the ripening of the seed and shedding of the last leaf. The mandrake is not native to my locality in Maine. My plants came from the Shaker Village where they were set out nearly a century and a half ago for medicinal purposes, which makes it the more interesting.

Along with the mandrakes come the tight little crosiers of the three varieties of *Phegopteris,* the long beech, the broad beech and the oak ferns. None of these are common about Alfred, Maine. The broad beech came from the only station in York County, and the two others I brought down from the White Mountains of New Hampshire, yet all three grow luxuriantly in their beds of native soil.

I have been told that the lady's slipper cannot be transplanted, but those that I took out of the pine woods several years ago not only blossomed but have set seed. This year I brought a dozen baby plants with plenty of pine needles to live with the older ladies. The reason I took them was that they had come up near a path that was used by a gang of boys who were building a camp, and I knew that they would be trampled upon if I did not rescue them. I call that conservation. These were the common pink variety.

Maidenhair ferns that came from northern New Hampshire also come up year after year. They were growing in an old sap-orchard so I brought along a good supply of leaf mold and set them in their own soil just back of the ladies' slippers that were growing in pine needles. They soon became such amicable neighbors that the ferns shaded the orchids in blossom time.

In a little colony by themselves the ebony spleenwort, the maidenhair spleenwort and common polypody thrive on a rocky formation just beyond the fragile bladder fern that I found growing in a cranny at the root of a big tree from which I dug a nice bag of rich, black mold.

The lovely *Linnaea* or twinflower, partridge-berry, and *Dalibarda* creep around under the ferns, each imbedded in a generous supply of its own particular earth, while two kinds of rattlesnake plantain keep the moccasin flowers company. And so, from the time the snow melts in the spring until it gently sifts over the Christmas ferns in late fall, leaving only the longest fronds rather untidily exposed, my adopted children give me a display quite unsurpassed in their native haunts.

Section two of my wild garden is nothing more than an ancient wooden washtub, the kind with two staves projecting higher than the others, having slits cut in them for handles. I filled it with sphagnum moss and water and set it by the well, planted tansy and ferns all around it and whenever I got a chance to go a-bogging I brought home some water-loving plant to put in it. *Calla palustris* was the first inmate. It blossomed all summer, and in the fall ripened handsome, soft, red berries crowded on the spadix much like the fruit of Jack-in-the-pulpit, something I perhaps would never have seen had it not been in my own yard, for *Calla* grows in remote swamps. Two kinds of *Sagittaria,* the halberd-leaved and the very slender-leaved, and blue pickerelweed were added, as were several pretty sedges and the odd little pipewort with its white cushion heads. There was always something in bloom and it was amazing to find that so few of the people who saw these flowers recognized them, especially the wild *Calla* with its waxen lily so much like the cultivated variety in miniature.

The other little tub or bog garden held quite a different array of plants, and there was always something new coming up to surprise me. This is only a galvanized tub filled with coarse gravel, muck, and loam, sunk in the ground and kept well-watered, placed where the plants get full sunshine all day just (Continued on page 254)

THE ATLANTIC'S BACKWATERS ARE SKIMMER PARADISES

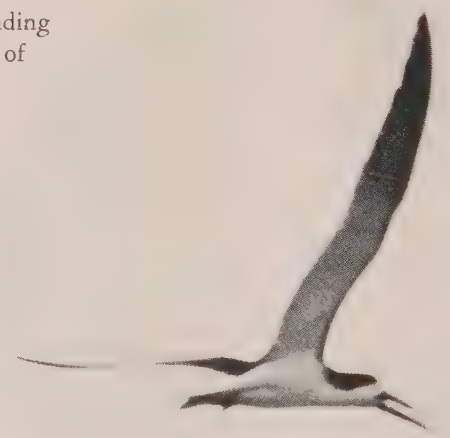
Especially endowed with a protruding lower bill, the black skimmer scoots along the surface of the water, scooping up shrimp and small fish. When a human approaches the nests they rise in a cloud and sweep "barking" overhead. The bird's peculiar bill is clearly shown in the picture below.

THE BLACK SKIMMER

By IVAN R. TOMKINS

Photographs by the author

THE pelican has received much publicity in legend and jingle because of its unusual beak and form, and so has many another bird of lesser peculiarities. But in the group of birds that includes the gulls and terns is another bird, the black skimmer, with an equally odd bill and manner of feeding, that scarcely gets any public mention at all. Not that we have any reason to believe the skimmer resents the lack of attention, for it apparently only desires to go its own way unhampered along the winding watercourses of the salt creeks of the South Atlantic states, to catch what small fishes or shrimps that it can, or to swing over the sandy islands off the coast that it chooses for a nesting place, "barking" the melodious note that has been likened to the baying of hounds.



This species has no sharp spear of a beak as have the herons; no tearing tool as possessed by the falcons and others of the hawk kind; nor yet a slim, sensitive bill with which to probe the soft mud and with this pair of forceps withdraw a juicy bit of food, like several of the shore bird species. But it has a slim, knife-edged lower bill much longer than the upper one, that is slim and narrow, and yet deep. As the bird wings its way along close to the water surface, the under bill cuts along the water, and if any small fish comes across it, the upper bill shuts down like a trap. The bill is well braced against sidewise strain where it articulates with the skull, and an ingenious set of extra joints, combined with the springy bones of the forehead, allows the gape to open much wider than would be possible through the articular joint alone. And the lower bill may, by this device, be held more nearly parallel with the neck than would otherwise be possible.

I watched for many hours before I saw a skimmer catch a fish, but one day as my boat drifted along and the flood tide rippled over the mudflat, one of the birds repeatedly "skimmed" down quite closely, and then swung back to make another beat. As I watched, the bill snapped shut and held a small fish or shrimp. A lift of the head and it was swallowed, and the bird at once dropped down to skim again. A half dozen bits of food were caught in the next few minutes. Although most of the fishes taken are small, sometimes in the nesting colonies one sees fish at least six inches long, and a young bird will often swallow a fish that is three-quarters of its own length.

Champlain, in 1605, visited New England, and there found the skimmer, now a rather rare bird in these states. This is a translation of what he wrote: "We saw also a sea-bird with a black beak, the upper part slightly aquiline, four inches long and in the form of a lancet; namely, the lower part representing the handle and the upper the blade, which is thin, sharp on both sides, and shorter by a third than the other, which circumstance is a matter of astonishment to many persons, who cannot comprehend how it

THREE YOUTHFUL SKIMMERETS SEEM PLEASED WITH THE WORLD

As is the case with most babies, the young skimmers' first thought is of food. The largest bird pictured has just swallowed a shrimp, the last bite being the unfortunate victim's antennae. Note the crack in the middle egg. In a few moments there will be four skimmers

is possible for the bird to eat with such a beak. It is the size of a pigeon, the wings being very long in proportion to the body, the tail short, as also the legs, which are red; the feet small and flat. The plumage on the upperparts is gray-brown, and on the underparts white. They go always in flocks along the seashore, like the pigeons with us."

In Louisiana one of the names is "bec-a-lancet-a-mer", which approximates the description given by the great explorer. Another name is "scissor-bill". Along Chesapeake Bay, it is known as a "flood-gull", because in skimming it follows the flood tide into the many meandering creeks. Of course on flood tide many small fish feed close to the water's edge. In some places "shearwater" is a common name, though this name is more widely applied to a group of seabirds that in no wise resembles the skimmer. Altogether, skimmer is the best name.

The gulls and terns, close relatives, have developed along more adaptable lines. Possibly no birds are so well suited to live under a variety of conditions as some of the gulls. In a watery world their waterproof breast feathers, webbed feet and long wings fit them for this kind of a life, and like most of the sea birds they can drink salt water and thrive. A strong yet well-pointed bill allows them to tear tough food, which can be swallowed down a throat that is amply large, and also break into harder substances, yet pick up small bits with equal ease. Good walkers, with well-balanced bodies, they are at home on the shore or in fairly dense vegetation. And with an appetite that may be satisfied by raw fish or the food to be found in a cornfield, adaptability is everywhere evident. But the skimmers, of which there are a number of species along the shores of various parts of the world, have developed along a specialized line. There is abundant evidence in Nature's record of numberless lines that have so developed and, at the least unfavorable change in living conditions, have been unable to adapt themselves, and so became extinct. It is almost certainly true that any closely followed path of food habits assists in establishing body changes from which there is no returning, and that an adaptability once lost can never be regained. How many, many generations of proto-skimmers must have snatched live food from the shallow water before the body changes so convenient to that mode of life became established in the form of the bird we know today. The long slim bill, the muscular development of the neck, the wings that lift so high above the water surface when skimming, all are characters that were not molded into the present form in a short time, but after many trials.

One day I found an adult skimmer penned in an open space perhaps twenty feet across that was surrounded by waist-high grass. It could not fly out. When picked up carefully and tossed in the air, it drifted across to the nearest sandbar. The poorly balanced body and the slender feet, too weak for much walking, bespoke of generations of scanty use, a fact that presents a possible danger to the bird if, in any way, its normal habitat should change.

Body characters determine the necessary nesting place—an open and barren space near wide flats on which food can be obtained. Shallow water on these flats is needed, as the food species must swim close to the surface to be readily caught.

On the low-lying coastal islands of sand and oystershell, the skimmers come each year to nest, and frequently make their nesting hollows so close to the water that spring tides and northeast winds destroy numbers of the eggs and nests.

They seldom try to reclaim a nest that is even partially covered with sand, preferring to take up another claim and lay another set. I knew a newly-built island of barren sand on which these birds laid their eggs in great numbers for many years, nesting on the higher parts well away from the reach of the tides. Summer squalls washed out many nests, prolonging the laying season from early June until late August, but the results were fairly successful. The necessary "nesting territory", or the distance each bird requires for taking off or alighting, or otherwise defends by natural pugnacity, was maintained.

But as the years passed and vegetation grew, they kept crowding together and moving down to the bare spaces closer to the water's edge, until at last the only places used were within reach of the spring tides, and throughout the summer every week or so a small colony would be nearly wiped out, to settle a little way off and start nests anew.

This crowding brought too great a concentration, and nests, that under the freedom of unlimited space had seldom been closer than six feet, here were more often twenty inches or less apart. The normal set of eggs is four, occasionally five, but now one could find as many as nine in a nest, doubtless the result of two females laying in the same hollow.

On one small bar, roughly oval, forty feet long by thirty feet wide, were seventy occupied nests, and the ground was strewn with punctured eggs. These had plainly been punctured by the thin skimmer bills, another manifestation of too much crowding and the defense of nesting territory.

Many persons, viewing this havoc, at once questioned: "Why do they not nest in other places? Certainly there is plenty of room." But the answer always is that they nest here because they must. There is no alternative, with their bodies so developed.

When, after the necessary time of incubation, the chicks hatch, then the tumult begins, for the young birds soon run everywhere in the colony, and on approach of an intruder drop into the nearest nest hollow, or lie close by some stick or by the drift sedge piled up by the tides. During much of the hot day, the larger ones go down to where the sand is moist and cool as it is uncovered by the receding tide, and there scratch a hole in which to lie, and, because of their protective coloration, become visually a part of the beach.

One wonders how the parents can know their young, in such a hodge-podge of chicks of all ages running around in the neighborhood.

When just out of the nest they can run much better than they ever will when the long wings and tail are grown, for the young birds are much closer to the more central of the ancestral forms of which we know so little; more like young gulls with well-balanced bodies and strong, well-proportioned feet.

Soon, lifting stubby wings with partly grown primaries, they learn to run against the breeze, half lifting themselves in flight, and then a little later they follow the older birds in flight, to likewise dip the lower mandible, now starting to grow a longer horny sheath, into the shallow water where swim the shrimps and small fishes so necessary to the continuation of the species.

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The Argus Pheasant

By EDITH M. LAING

On a stamp of North Borneo is pictured the famous Argus pheasant. Legends handed down by the natives of many lands relate how this or that bird obtained its coloring. The Argus pheasant has not been overlooked in this respect, for a Malay legend tells that it once had plumage of a dingy appearance. Suffering from an inferiority complex, the unhappy bird begged the crow to paint it in glowing colors. Like a good fellow the crow did so, and then asked the pheasant to do likewise for him. It seems too bad to give this tale an unhappy ending, but the report is that the pheasant not only refused, but spilled a bottle of ink over the obliging crow!

Although the Argus is not the most brilliantly colored of the pheasants, it is the most striking. In general the upper parts are mottled with black, brown and yellowish buff. It derives its name from the peculiarities of the highly-developed secondary feathers of the wing. These are long, and each one is ornamented with a series of brilliant eye-like spots, edged with white, on its outer web. The allusion, of course, is to the Argus who, by virtue of his numerous eyes, managed to keep awake to guard himself until at last he was fatally charmed by the music of Mercury. After the death of the monster, the goddess Hera used his eyes to ornament the wings of the Argus. Thus was a touch of surpassing art added to the plainer work of the friendly crow.

It is the male bird that is thus specially adorned, and, in addition, two middle tail feathers grow to the conspicuous length of nearly four feet. The full spread of this gorgeous feathering is shown to perfection in the stamp illustrated.

Although the Argus has such beautiful wings, the over-developed secondaries seem to be a hindrance, and ordinarily it seems to be a poor flyer. Under stress, however, it acquits itself well. It is, however, a swift runner, and in this activity the wings seem to help it in balancing and turning.

The Argus best known is the Malay form, *Argusianus argus,* described by Linnæus. It occupies the Malay Peninsula from Siam southward, and the island of Sumatra. Another species, *Argusianus grayi,* occupies the interior of Borneo, and this is the one pictured on the stamp. Still another species, from an unknown locality, is known only from a single wing feather that was found among some stray specimens in a case in the British Museum.

North Borneo, northernmost part of the great island of Borneo, and the neighboring states, Sarawak and Brunei, are under British rule. The island of Labuan, whose name is overprinted on the stamp, lies six miles off the western coast of North Borneo. Before North Borneo came under the administration of the Straits Settlements, its stamps served Labuan for postage.

UNCLE SAM'S BIGGEST SAND PILE

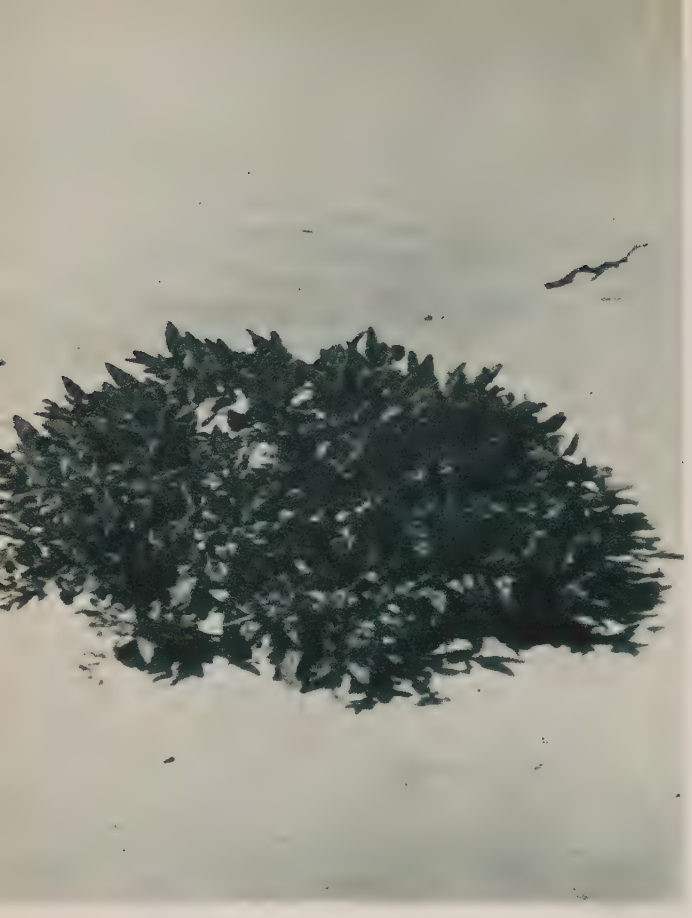
And What Can Grow There

By FRED W EMERSON

A general view of the White Sands National Monument, New Mexico. The sand is sparkling gypsum. Youngsters and grown-ups alike enjoy frolicking on this natural playground, and it is estimated that 25,000 children have visited the spot, near Alamogordo, set aside as a National Monument in 1933. Photograph courtesy U. S. Department of Interior.

One of our most striking of national monuments consists of 142,000 acres of *white* sand; so white that in noonday sun, one seems to look upon vast snow drifts that never melt. These white dunes, constantly shifting with the strong winds, furnish to the naturalist a field of unique interest. Light-colored mice and lizards have been found, inspiring research. Botanical developments are less spectacular but no less real.

These white sands of southern New Mexico are formed of crystals of almost pure gypsum, a soft mineral somewhat soluble in water. Examinations show that the organic matter present is "too slight in quantity to have much significance as nutrient material for plants." Yet at least sixty-two species are much at home, some adapting themselves strangely to unusual conditions. It is in the packed and crusted flats between moving dunes that plants begin to grow. Once established, seven species are able to grow upward through the encroaching sands. These also produce adventitious roots from their sand-covered stems, thus getting moisture,



The narrow-leaved sand verbena, *Abronia angustifolia,* thrives at White Sands, but it is found nowhere else in the world. The tall spike of the desert yucca is pictured below. This is the state flower of New Mexico and is one of the most characteristic plants of the White Sands region.

and bracing themselves by the same device.

As one approaches the White Sands by an excellent highway, southwest from Alamogordo, New Mexico, he sees a high wall of white extending for some miles. Among the scattered dark patches of plants you discover aromatic sumac behaving in a peculiar way. The normal height of the shrub is four to five feet. Digging will convince you that the individual you examine at the top of a fifty-foot dune has its roots fifty feet below in what was once a flat! In the same area you are sure to see peculiar mounds of hardened sand covered with sumac. Adventitious roots have been able, in times of driving winds, to hold some sand in place, creating a more or less permanent mound.

On the flats and sides of dunes are many specimens of yucca. The species in the flats grows about five feet high. On the dunes this valiant desert plant quadruples its height, lengthening its trunk and keeping its dagger-like leaves in the life-giving air and light above the engulfing dune.

If you see a strange-looking, leafless shrub, three or four feet tall, it is *Ephedra,* called also switch plant and Mormon tea. Its much-branched stems are light green. A three-foot *Ephedra* on a dune means that buried in the sand is a stem several times that height.

One tree, the valley cottonwood, comes into The Sands. Often a large tree along stream banks in the Southwest, in the White Sands it may be found in every degree of success and failure. When successful, as it frequently is, this tree keeps its upper branches well above encroaching sand, putting out enormous roots into the moist sand that packs around its trunk. If the sand moves on, leaving the tree without sufficient anchorage, it may lose its water-absorbing root tips and die.

Another interesting species is a fragrant giant mint, first cousin of the tiny pennyroyal of the East. In the flats it grows three feet high; on an advancing dune it may reach a height of forty feet.

On this page we see three other White Sands plants that have been able to maintain existence in surroundings where there is no apparent nourishment. So tenacious are the roots of the aromatic sumac, *Schmaltzia,* that the soil in which it grows remains piled about the roots after the winds have blown away the surrounding sand.

The second picture shows the strange joint-fir, *Ephedra,* a plant whose leaves are reduced to tiny bracts, with its adventitious roots laid bare by the receding sand. Our genus is one of three, wide-spread and ancient in origin, which form the order Gnetales, related to the pines.

This cottonwood, originally growing in the rich valley soil, was partly buried by the sterile drifting sands, but was able to maintain existence by sending down from its trunk these large adventitious roots. Now that a change in habit of the intruding dunes has again bared its trunk, the life-preserving roots are exposed.

Two other shrubs, shad-scale and rabbit-brush, are sand resisters. During the growing season both are pale grayish-green, fitting well into the snowy landscape. Both about three feet high in the flats, shad-scale may reach a dune height of forty feet, rabbit-brush giving up the struggle at about twenty. Shad-scale may be recognized by its hop-like tufts of last year's fruits. Rabbit-brush is a ball of yellow in early bloom-time; beautiful in late summer and fall with its straw-colored masses of down-covered seeds.

Most of the other plants grow in the flats only. They are able to endure the winds, and the glare of the sun, but cannot survive being covered with sand. Such is the narrow-leaved sand verbena, actually a four-o'clock and found nowhere else in the world. It has thick, pale green leaves and lavender flowers.

In early summer the flats are beautiful with four species of mallows, an evening star, a milkweed, a morning-glory, a mustard, several species of cactuses, one true verbena, a *Gilia* and thirteen asters mingling their colors with thirteen species of waving grass.

How plants grow in nearly pure gypsum we do not know. That unanswered question prods the investigator to repeated visits and continued study. But let the skeptical lover of the beautiful and unique in Nature go and see for himself that in some way they *do* grow. Although he travels far he will be well paid for his journey when he stands in this sea of white loveliness, seeing afar, in all directions, mountains of many forms in shades of blue and purple, and near at hand the rare plant life of The Sands.

SKYRIDERS

Text and pictures, unless otherwise credited, by Frank and John Craighead

DUCK HAWK

With broad shoulders, long, powerful wings, strong talons, keen sight, and streamlined body, the duck hawk, tireless in wind and muscle, is a living example of Nature's perfection. If the more fit survive, as they should, the duck hawk must keep on living. To insure this, man, its only enemy, must forget his unjustifiable and traditional hatred for this noble bird. The duck hawk is a bird of the upper air, courageous, intelligent, among the fastest of all hawks. It takes its food in the air by superior powers of flight, and raises its young on precipitous cliffs, yet is gradually disappearing.

Above, at right, is the adult in its streamlined perfection; photograph courtesy White Sulphur Springs, W. Va., News Bureau. Our other pictures taken in Maryland in April, 1934 and in Pennsylvania in June, 1936, show a brave mother sheltering her young on a mountain cliff, and a representative group of young ones.

PIGEON HAWK

This beautiful hawk is one of our smallest species. In some form it ranges from the Atlantic to the Pacific, breeding in our northern states and northward to the limit of trees, and wintering mainly in our south. These pictures were taken in northern Minnesota, where its favorite haunts are wooded islands or a long peninsula, for it prefers a site near water. It resents intrusion and often betrays the location of the nest by its resentful screaming and restless movements. When one climbs to the nest, especially if it holds young, the parents may even strike him in their excitement. Insects and small birds are the principal food of this hawk.

The mother pigeon hawk shown here shields her tender young at night, for in their home it is chilly even in July. The last photograph pictures a young one whose plumage has been developing fast, and a larger one, a female, that has been getting more than its share of food.

BROAD-WINGED HAWK

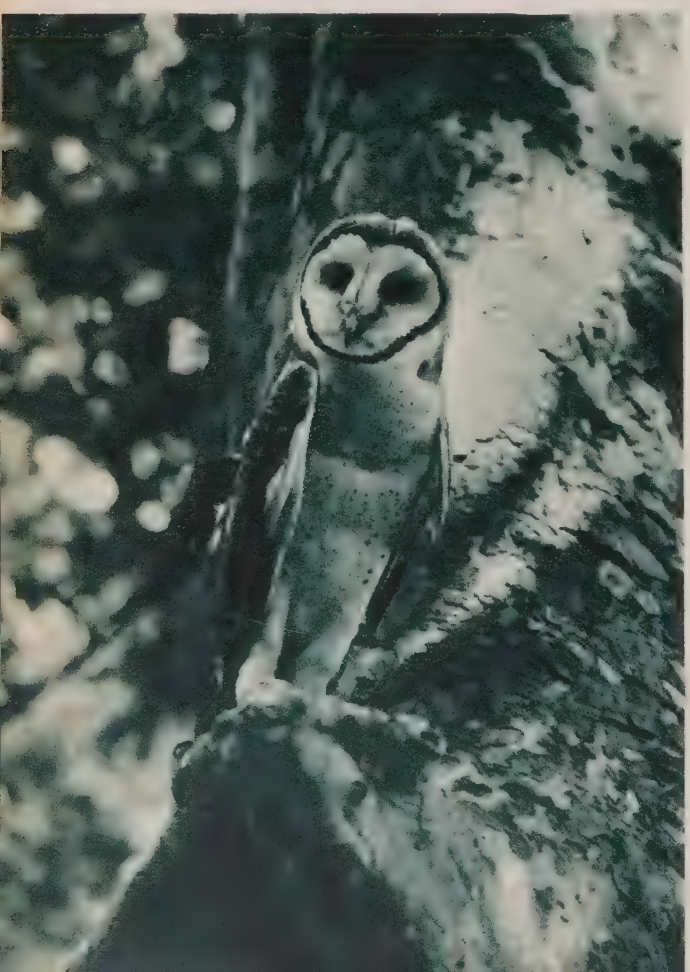
This is one of the more beneficial of our hawks, for it is seldom that its choice of food interferes with man's interests. It nests mainly in the eastern part of the country and does not range far into Canada.

In the vicinity of Washington, D. C., where these pictures were taken, the broad-wings usually lay their eggs about the second week of May. Either a conifer or a deciduous tree may be chosen as the nesting site, although the latter usually is preferred. If a crotch is found high above the ground, so much the better, but if none such is available a low one will do. "A last year's crow's nest saves time and energy, so why not repair and remodel it?" Thus seems to reason the broad-winged hawk. Of all the eastern hawks, the young broad-winged seem the most attractive. Like all hawks, the young are hatched covered with down, but while most baby hawks have a fuzzy white coat, that of the broad-winged young is silky and light yellow. In sharp contrast to this color is the tiny black beak. From our standpoint, however, Nature has played a trick on these little hawks, for they increase in ugliness with their size. Finally relenting, she restores some of their beauty when they reach maturity. Also, Nature did not fit these birds for an active and exciting life, as hawk lives go. They feed mainly on small rodents, snakes, insects and an occasional bird, if they can catch a slow one. They are, however, a perfect example of a hawk to be protected and allowed to benefit from their handicaps.

COOPER'S HAWK

Many consider this species the finest of our hawks as well as one of the wildest and most cunning in its habits. Because it flies close to the ground, usually through the woods, it is hard to detect, and its nesting site is seldom discovered because, unlike most of the larger species, this hawk does not scream and circle above its nest when man approaches, but slinks away silently. Thus it is seldom found at home by even the most careful stalkers, except during the period when it is incubating. We had tried, always without success, to photograph an old Cooper's hawk, but in the spring of 1936 we tried again. From dawn to dusk, five days in succession, we waited in a blind at a nest in Maryland. During this period the parent birds returned only three times when it was possible to take pictures. Whether the birds were afraid of our cameras or whether they preferred to wait until it was almost dark to feed their youngsters, we could not decide. The young hawks got one and sometimes two big meals a day, usually when dusk had come on. They developed normally, however, with no hunger streaks in their feathers. We wondered if they would have been fed more often had we not been there. Most hawks, after they have become used to a camera, feed their young often and regularly. The Cooper's hawk is such a wonderful hunter that lack of food could not have been the cause. We think this hawk was too intelligent and wary to reveal its secrets.

SCREECH AND BARN OWL



These young screech owls, native Virginians just out of their dark, snug home, are viewing a world new and strange. The difference in size is in part due to their age, for young owls usually hatch on successive days, or to difference in sex, the females being the larger.

We call all barn owls by a nickname—Windy, because at every nest we have visited either the old birds would hiss at us from the dark depths of their hollows, or the young owls would sway ominously from side to side and emit a noise that sounded very much like steam escaping from a boiler. The barn owl's hollow has a strong ammonia smell and is always littered with mouse castings.

The barn owl is a veritable mouse trap. It can easily eat three mice at a meal and each of its five or six growing young can put away as many. Not only can, but does, and it is not often that the family is hungry.

The barn owl starts to incubate its white eggs just as soon as the first one is laid. This causes them to hatch at different times, and consequently the young owls are in different stages of development. One may look like a shapeless lump of pink flesh, while at his side is another covered with white down. In a large family it often happens that the youngest does not survive; for each young bird must look out for himself to a great extent. The males have a white breast spotted with black dots, while the females have a tan breast, similarly spotted. This owl is interesting and one of man's best friends.

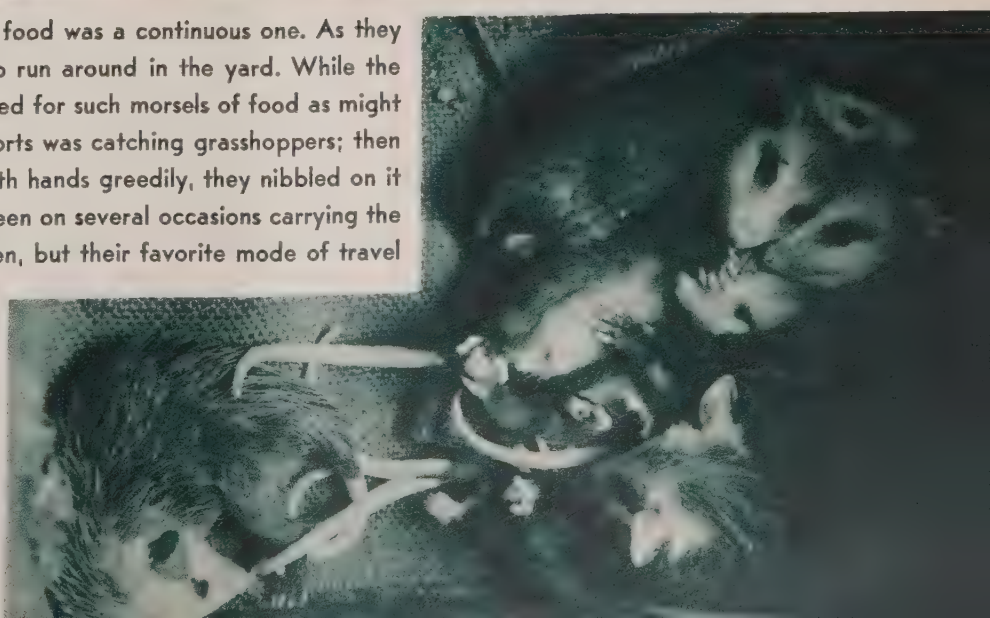
AN UNUSUAL CAT FAMILY

By MARTHA J. GILLESPIE

Tabby was quite dissatisfied with her new family of just one kitten; the baby opossums that I found needed a mother. Therefore I put the orphans in her box and awaited results. She loved and fondled the little strangers as much as she did her own baby; however only one of them learned to enjoy kitty dinner.

Like the cat, the little marsupials washed their hands after eating. To do this they sat up erect, spread their fingers and rubbed the palms together, slipping the fingers in between each other as a child would. Much of their leisure time was spent in combing their soft silky fur; all foreign substances were removed by biting at their fingers monkey-like.

To the young opossums life was serious, and the search for food was a continuous one. As they grew older, they were permitted to run around in the yard. While the kitten chased their tails they searched for such morsels of food as might be found. One of their favorite sports was catching grasshoppers; then clutching this delicacy in one or both hands greedily, they nibbled on it in a fastidious manner. Tabby was seen on several occasions carrying the little fellows as she carried her kitten, but their favorite mode of travel was to cling to the cat's back in much the same way that Nature had taught them to ride the back of mother opossum.



THE AGILE SAND CRAB

By IVAN R. TOMKINS

The little mounds of sand and the flat-bottomed, rounded holes of the sand crab are familiar to most beach strollers of our Atlantic coast from Virginia southward. Occasionally one may catch this yellow crab far away from home, resting quietly on the beach, hoping to be overlooked until the intruder is gone. Usually one does not see it until it moves, and then one must realize that here is an expert in running, for it can, almost without pause, reverse its direction or turn at right angles to its former course. But by examining the tracks we see that it usually walks forward on all its running legs.

It is always amusing to see a crab reach up with one foot and pry an eyestalk upright from a sand-filled socket. Like all the group, this species has its eyes set on erectable stalks that can be retracted into sockets.

This crab has the reputation of carrying off turtle

eggs, and when any good sized supply of food is dragged into the burrow, a plug of sand warns others that the owner is not at home for the present.

The eggs, as in all crabs, are fertilized before extrusion and when laid are furnished with a sticky secretion that causes them to become attached to the appendages, called swimmerets, situated on certain of the abdominal segments of the female. After a time these eggs hatch into tiny creatures that bear very little resemblance to the adults. These molt several times as their larger size demands more room, and then assume another stage somewhat more nearly approaching the parent in its characteristics. In the course of a few weeks, the young crabs, which up to this time are inhabitants of the water, are able to take to the land. The female in one of the pictures is carrying about many hundreds of eggs. These are merely laid in the water, and the young must shift for themselves from the time they are hatched.

In the case of some of the relatives of the sand crab, as the crayfish and the lobster, the young remain attached to the swimmerets by a thread-like arrangement, and later cling by their pincers, but, as with most crabs, the young of the sand crab is not so fortunate.

OCTOBER

No picture is more typical of October in southern Canada and our northern states than the opened pods and wind-blown plumes of the common milkweed. The early frosts have nipped the leaves and now they hang dry and crisp on the withered stalk. The dried pods split open and every breeze teases out the plumes that carry the seeds, and speeds them on their way in search of new germinating ground. Soon will come the crisp days of November, to find the withered plants, their leaves broken, their pods empty and useless, save for the beauty of their velvet lining, yet bearing in their prudent roots, deep in the earth, the promise of future seasons of activity. This is a "spirit of the month" photograph by Colin S. Farmer, Toronto, Canada.

MAC —
The Flying Squirrel

By ELIZABETH INGLES

Photographs by Lloyd G. Ingles

Mac took up residence at the Douglas Lake Biological Station, Michigan, early in August. He could not properly be called a student, for he defied the dean by sleeping all day and spending the night in riotous living. He even invaded the sacred limits of faculty row, being so bold as to select the cabin of the botany professor as the site for his home. Known familiarly as a flying squirrel, Mac was further distinguished as a member of the species called by the mammalogists *Glaucomys sabrinus macrotis*.

The botany professor's cabin was situated on the main street of the campus, and for convenience a fire extinguisher had been placed on the outside wall close to the door. Mac gathered leaves of the paper birch for the nest that he built carefully in the top of the fire extinguisher box. The activities of the students at the Station seemed to bother him not at all, and on occasion a gentle tap on the outside of the box brought him from the nest at once to investigate the intruder. In spite of the fact that he was a timid, nervous creature, Mac had an insatiable curiosity.

Mac was unpopular with the ornithology students as he had a bad habit, on his nights out, of raiding the birds' nests that were under observation on the campus.

Like all flying squirrels, Mac had folds of skin on each side of his body from wrist to ankle, stiffened by a bony rod arising from the wrist. Although commonly called wings these membranes have no power of propulsion, but are used for gliding, like the wings of a plane. On one occasion Mac was observed to jump from the branch of a tree, and with legs outspread to glide to a neighboring tree fifty yards or more distant, using his broad, flat tail as a rudder.

Mac was a handsome fellow with his soft, silky, gray pelage, but his large protruding eyes, so characteristic of many night prowlers, gave him an elfin, somewhat unnatural appearance.

When the summer session at the biological station closed, Mac stayed on. He must have found it rather lonesome without the prying eyes of the mammalogists, or the friendly interest of the botany professor.

PALM TO PINE

By M. P. McMILLIN

"FROM Palm to Pine," a new highway recently opened in southern California, is a delight to all Nature lovers, and especially so to those who revel in the myriad flowers of sandy deserts or snow-crowned mountain heights. Starting among cactuses and native palms of the Colorado Desert, the road winds sharply up to the yellow pines and alpine flora of cloud-wreathed Mount San Jacinto.

One familiar sight along the road is the desert yucca, sometimes called "Our Lord's candle." At the base of the snow-covered mountains it rears its shaggy spire, which in spring is covered with waxy-white, lily-like bells. The seeds are still gathered by the Indians who grind them into meal that they boil to make a palatable mush.

Higher on the mountain slopes is found that scarlet wonder of the forest—the snow

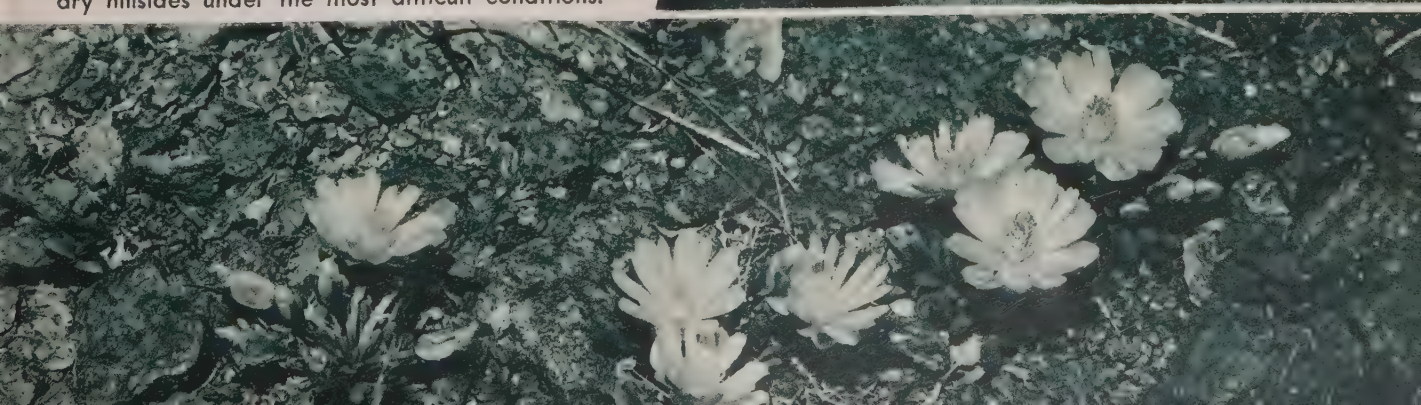
plant, *Sarcodes sanguinea.* Its vivid red shafts, with the pendant, bell-shaped scarlet flowers, shoot up through the carpet of pine needles. It is akin to the Indian pipe, bears bracts instead of leaves, and draws nourishment from decaying matter in the soil.

The prickly poppy, *Argemone,* pictured last on the preceding page, is another desert plant; it bears a beautiful flower with diaphanous white petals. The prickly stem of the plant, when broken, exudes a milky juice.

Two of the more common flowering plants of the desert are the delicate primroses and the sand verbenas. Pictured here against the background of San Jacinto mountains, these desert flowers bloom soon after the first spring rain. The fragrant primrose has a cup-shaped pure white blossom with a touch of yellow at the heart. Side by side with it glow the pink and lavender tints of the desert verbena with a background of grayish foliage.

In some of the canyons of the desert may be found the California fan palm, *Washingtonia filifera.* This tree, which probably had its origin when the present desert was a great inland sea, has wide-spreading leaves resembling immense fans. These remnants of a geological age long past, often towering eighty to one hundred feet in height, grow indigenously in scattered groups or in forests.

High up on the slopes of the mountains is found a delicate rose-tinted flower of an exquisite silken texture. This plant, the bitter-root, received its scientific name, *Lewisia rediviva,* in honor of the explorer Meriwether Lewis, and specifically, in honor of its own tenacity in thriving on the open dry hillsides under the most difficult conditions.



Where an open stand of pines permits the sunlight to filter through to the ground, wide lush growths of lupine may be found. The pea-shaped flowers of bright blue, shading to white or pink, are thickly clustered in spikes that extend upward from a luxuriant leafy base of blue-green. Lower on the mountains, the lupines grow two feet or more high, but because of the short growing season those near the summits may be only an inch or two tall.

The prickly phlox, pictured below, is perhaps the most beautiful of all the *Polemoniaceae*. The lovely rose-pink blossoms seem to smother the low shrub with its satiny petals. They are fragrant, but the spiny foliage quickly repels any too ardent admirer who would ruthlessly gather a bouquet.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

★

NEW PARK PROPOSED

Proposals for the creation of new National Parks have been frequent. Many of these have been inspired by local pride or by some local commercial interest. Some have been rejected; others have been successful in adding areas to our system of National Parks at the expense of the properly high standards originally set for a National Park.

The most recent proposal, however, is one that merits the most careful consideration. We refer to the movement to set aside five hundred and four square miles of the Maine wilderness, known generally as the Katahdin region, as Katahdin National Park. An enabling act to this end has been filed in Congress by Ralph O. Brewster of Maine. The region involved and its outstanding merits are described elsewhere in this issue by Myron H. Avery, Chairman of the Appalachian Trail Conference, a State-of-Mainer, hiker and lover of the outdoors and the wilderness. We need take no more space here to discuss the outstanding values of this region beyond saying that another decade will see it exploited by the axe and other commercialism beyond any possibility of redemption.

It is, however, pertinent to consider two or three points that have arisen in connection with the Katahdin Park movement. Opposition to it has come from what is, to us, a rather surprising source. We find Percival P. Baxter, former Governor of Maine, sincere conservationist and splendid citizen, against the proposal.

Over a period of twenty-six years Mr. Baxter, in the face of political and commercial opposition, acquired the summit of Mount Katahdin and contiguous area totalling nine square miles. This he deeded to the State of Maine in perpetuity, and the area is now known as Baxter State Park. Its donor naturally feels that this gift should remain the property of the people of his State and should not be transferred to the Federal Government. Whatever the merits of this controversy, we see no reason why Baxter State Park can not and should not remain the property of Maine. However, under Maine law no State Park may exceed ten thousand acres, which means that little could be added to the present area as protection for the mountain.

It is there that the importance of the Katahdin Park proposal seems to us to center. We have seen cities set aside and develop beautiful park areas only to have them surrounded by billboards and other nuisances. Comparably, if the region close to Baxter Park is to be logged off, laced with roads and otherwise opened up—and there is no protection against such activities—the present reservation is irreparably damaged. If we could afford it we would buy lots on all four sides of our home to protect us from architectural atrocities and other ill-advised acts of man. That is what a Katahdin National Park would do for Mt. Katahdin and Mr. Baxter's gift to the State of Maine.

There appears also to be doubt in Mr. Baxter's mind as to what the National Park Service might do to the Katahdin region. He fears over-development, the building of scenic highways through the area, the civilization of a wilderness that is within the rubber-tired reach of millions. Mr. Baxter has basis for such fears, and we should like to see some definite guarantee against such development. We believe that the National Park Service would wish to treat this area as it should be treated. At the same time the Service is under pressure from political and local commercial interests to so develop some of the

properties entrusted to it by the people so that the maximum number of tourists will be attracted.

At the present time Baxter State Park is suffering from under rather than over-development. The Maine authorities seem to exhibit a vast lack of interest in it. It is unsupervised. More and more people are seeking the outdoors on foot with packs on their backs, yet no provision is made for this increase. A few lean-tos near the base of Katahdin at Chimney Pond, where concentration should be minimized rather than increased, were recently put in by some tree-butcher without regard for proper placement. Thus certainly this Maine State Park would hardly suffer by being surrounded by properly controlled National Park areas. The paramount issue is the preservation of the larger Katahdin wilderness, and the question of where should remain the title to these nine square miles should not obscure the major issue, or lead to irreparable losses.

We believe that these differences can be easily ironed out. We hope that Mr. Baxter will join forces in this and aid in preserving this glorious Maine wilderness for posterity. And there, it seems to us, is the vital consideration. Now that the Great Smokies are preserved, and the Everglades Park plan is progressing, the Katahdin region is our last remaining substantial wilderness in the East. It should be preserved. Delay is dangerous. But in endorsing this proposal may we say that we would fight to the last ditch against the betrayal of the Katahdin region to selfish political or commercial interests that would make a glorified public camping ground out of it.

PAGING MR. CROW

It is doubtful whether there has ever been filmed a scene more starkly exciting than the mad battle against the grasshopper hordes in "The Good Earth". Yet shortly after we saw this great motion picture we saw briefly in a news reel a picture of an American farmer, his wife and children pathetically killing grasshoppers among the rows of their ill-fated corn crop.

There was, in both of these scenes, a lesson in conservation. There have always been cases of devastating swarming of grasshoppers. In this country they have always been worst on the normally treeless plains where there is little or no bird life. In China, where the destruction of tree and bird life has been going on for centuries, it is only natural that such insect devastation should occur unchecked by any other force of Nature. In most parts of the United States this should not be the case. Yet even here the prospects are not bright if we continue mass killing of the birds that Nature provided to maintain her balance.

The now classic instance of birddom's rallying to the side of man in the insect battle is the gathering of the gulls near Great Salt Lake to check the grasshoppers and crickets. But gulls cannot be expected to come to the aid of Kansas, Ohio, Illinois, Wisconsin, or other of our mid-Western States. They must rely largely on resident birds. Yet these and other states are either encouraging, or actually promoting, the systematic destruction of a great ally against the grasshopper and other destructive spring and summer insects. That ally, whether the state conservation departments, the arms and ammunition company propagandists, or others like it or not, is the crow.

Between early April and late August crows depend upon insects for more than one-third of their food. Extensive analysis of the contents of crows' stomachs reveals that one hundred grasshoppers eaten during an hour or two of feeding is no feat for a crow. A group of four nestling crows will keep the parent busy for an hour or so, and in that time consume 400 grasshoppers. Analysis of the stomachs of 157 crows in a grasshopper-infested area showed 151 of them to have eaten generously of the insects. The evidence of the crow's importance in holding this insect pest in check is voluminous and indisputable.

About some of the trading posts in central Canada, where grasshoppers periodically ravage the vegetable gardens, both Indians and whites appreciate the help of the crow and encourage the few that nest there, as well as the hordes of blackbirds, to feed freely throughout the summer about the villages. There even the children are taught to protect these birds in gratitude for payment received in advance.

Yet, on the other side of the shield, we find the Indiana Department of Conservation, for instance, proudly boasting that its campaign of prize awards for crow feet has resulted in 194,271 fewer crows. If, with utter conservatism, we say that each one of these crows, in the face of grasshopper over-abundance, ate fifty insects a day, then there would be 9,713,550 more grasshoppers than if the crows had been left alive. And fifty a day would be just whetting a hungry crow's appetite. Multiply this nearly ten million hoppers—that the kindly conservation commission has spared to eat the Hoosier farmer's products—by the fifteen or twenty days of a grasshopper invasion and we get some idea of how useful a crow can be.

Of course, the big black birds are not the only victims of these organized "vermin hunts". Useful hawks and owls are shot; in fact the philosophy of these hunts is usually: "Shoot anything that flies. Who's to know the difference?"

Isn't it about time we quit laying dust storms, floods, insect invasions and such to acts of God or fate? Isn't it about time we started using instead of abusing Nature's forces? Isn't it about time we acted upon the advice of men who have devoted their lives to learning the facts, instead of accepting as Gospel the opinions of the ignorant, or the specious propaganda of the man who has some ulterior motive?

It's not only *about* time, it's *past* time.

"NORTH DAKOTA SUSIE"

By C. A. F. MACBETH

HER WILD NATURE NEVER TOTALLY DISAPPEARED

She was ever alert, never eating many mouthfuls without raising her head to look around, pointed ears erect for any hint of danger

SHE had been through a prairie fire and survived: such was the amazing history of the little yellow-dappled creature that staggered unsteadily on stilt-like legs about a North Dakota ranch-house door.

Where the Yellowstone pours into the Missouri, the bottom lands are covered with a dense growth of willow and buck-brush, making excellent cover for the white-tailed deer, which roam in herds a hundred strong along the quiet trails, emerging only at dusk to raid the alfalfa stacks of adjacent ranches. Six years of continued drought has killed off much of the heavy vegetation, and at the end of last May, when a fierce electric storm passed over, lightning set fire to the dry leaves. Fanned by a prairie gale of thirty miles an hour, the blaze tore through the parched thickets. Glowing twigs, tossed several feet in the air, rode on the wind for half a mile or more, incendiary agents.

By noon, several hundred farmers and ranchers, mindful of disaster-threatened homes, were on the spot armed with shovels, axes and wet blankets, the impedimenta of a prairie fire-fighter, determined to keep the giant conflagration within bounds. Deer ran everywhere, crazed and bewildered. Those fearing men more than fire darted back into the inferno and perished.

Shovelling a path to head off a line of fire, one rancher heard a plaintive bleating coming from the undergrowth, and saw a badly burned fawn, smoke-blinded, staggering helplessly. He carried it to his car, parked a mile off in a ploughed field for safety, laid the little creature on a blanket and locked the door. At sundown, the flames under control, he took the road home, driving fifteen miles with a whimpering fawn for company. He bathed its smoke-tortured eyes; and a queer sight it was after his first-aid ministrations, smeared with Unguentine, a bandage added here and there for good measure.

The feeding problem taxed his ingenuity to the utmost. At last he devised a new type of nursing bottle with a flannel-wrapped rooster quill stuck in the neck. But it satisfied "Susie". She thrived on her unlimited supply of warm milk, the burns healed, the inflamed eyes ceased to smart, and she accepted the bottle and the bed upon the kitchen floor without question. Though neither tethered nor confined in any manner during the day she kept close to the ranch-house door. The domestic cat (kitten size) sniffed about her, felinely inquisitive. But when her curiosity was satisfied, she went on her lone way, cordially indifferent. The greatest surprise was Pups, a large police dog.

She accepted Susie in place of her lost litter and wherever the fawn went, Pups was in close attendance. It seemed as if the dog sensed the defenceless condition of the tiny creature. Sometimes the two spent a whole day together in the woods, returning at dusk to eat and sleep.

Susie graduated from milk in a bottle to a dish of food, always shared with Pups. Like a rapidly growing child she was always hungry, and would steal everything edible within sight or reach: bread, cookies, cheese and

EVEN THE POLICE DOG ACCEPTED SUSIE

Pups and the deer became fast friends, and sometimes the two spent a whole day together in the woods, returning at dusk to eat and sleep

even sour pickles were pilfered without compunction.

Some of her wild manners stayed with her. She was always alert, never eating many mouthfuls without raising her head to look around, pointed ears erect for any hint of danger. Roving about the ranch on summer days, Susie met and mingled with the herds of wild deer, but she never failed to come bounding home at the whistle or the calling of her name.

One day, mowing on the flats, the men ceased work to watch the strange antics of the fawn who was rubbing her nose on the ground and then striking hard with her shiny black hoofs. She had fought a losing battle with a porcupine and bore several of the barbed quills in her tender muzzle. To remove them the rancher had to resort to strategy as well as strength. While she drank from a coaxing bowl of fresh milk one of the boys crept up quietly behind her and seized her. He managed with difficulty to hold the struggling little creature, despite the desperate tattoo of her hoofs which ripped his coat to shreds and cut even skin and flesh beneath. The rancher removed the offending barbs with a pair of pliers. As he expressed it, "Susie was off porcupines from then on."

With the approach of autumn she changed her dappled baby coat for a more somber one, so her owner added a bright red collar to make her more easily seen and to protect her from marauding marksmen.

Her thievish "clapper-claw" ways kept pace with her physical development. When the first snow fell it was a fascinating sight to watch that half-grown deer frolicing with the huge police dog, up and down the slopes above the ranch home. They always shared their meals, nose to nose in the same dish, and while Susie accepted Pups as her natural guardian, Pups responded by realizing her responsibility.

A closed season on deer brought the usual plague of illicit hunting. Men invaded the ranch lands bordering on the river as soon as the Missouri had frozen hard enough to bear the weight of a car. Early in December Susie disappeared. It was Pups who found the tragic evidence on the river-brink—the dappled hide, blood-stained and stiff, and close beside it a tiny bright red collar. And all through that night, a broken-hearted dog howled out her loneliness by the ranch-house door and would not be comforted.

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A Pacific Coast Bird Visits Maine

By ALFRED O. GROSS

A HEPBURN'S rosy finch, *Leucosticte tephrocotis littoralis* Baird, which during the breeding season inhabits the region above timber line of the mountains from Alaska to Oregon, unexpectedly appeared at Gorham, Maine. The bird was a regular visitor at a feeding shelf at the home of Mr. and Mrs. Verdell Waterman after it first arrived, December 15, 1936. It kept company with the members of a flock of about twenty-five English sparrows with which it appeared to have much in common. The western visitor, however, was very pugnacious and never allowed the sparrows to share the feeding shelf when it was there.

The bird was first reported by Miss Jessie Keene, instructor of biology of the Gorham Normal School, as an unusual bird, probably some form of the rosy finch. A bird so far out of its range could be any one of the six species and sub-species of *Leucosticte,* which are differentiated by characters difficult to determine in the field. Not wishing to sacrifice the bird, even for an important record, the finch was trapped on March 7, 1937, to enable the writer to band it and to make the necessary measurements and color determinations. A detailed comparison was made with a series of skins of the various *Leucostictes* from the Museum of Comparative Zoology, Cambridge, Massachusetts. After the bird was liberated it returned to the feeding shelf the next day none the worse for having gone through this unusual experience. It continued to feed there regularly. A definite record

thus has been established, and yet the bird lived to be enjoyed and studied by numerous ornithologists and bird lovers who journeyed to Gorham to see this finch, the first record of the species ever recorded east of the Mississippi River.

MOUNT KATAHDIN, SEEN ACROSS KATAHDIN LAKE

This is one of the unforgettable views of the famous mountain, part of which is now in Baxter State Park. Photographed by Samuel Merrill, courtesy Appalachian Trail Conference

Katahdin and Its Country

Proposal for a National Park in the wilderness of central Maine focuses attention on a glorious region

By MYRON H. AVERY

DEEP in the central Maine wilderness lies a region that bids fair to attain a rightly deserved pre-eminence in the ever increasing chain of federal reservations. It is a land of towering, glistening, bare granite peaks, interspersed with lower ranges mantled with the sombre-hued spruce and fir cover of the North Woods, the pattern of which is broken only by the silver sheen of lakes and streams, so numerous that, as one climber wrote, they resemble the scattered broken fragments of a mirror, so did they heliograph to the summits. It is a land of utter loneliness, deserted and as much a wilderness—save for casual travelers in the short summer months—as when the first explorer ventured into this domain 133 years ago.

It is this hinterland of the North Woods wilderness, widely known as the "Katahdin Country", this land of mountain, forest, lake and stream, that the Katahdin National Park Bill (H.R. 6599), introduced by Congressman Ralph O. Brewster of Maine, seeks to preserve forever in its larger whole as a heritage of the American people.

Katahdin, the mountain, has few peers in the esteem of those who, like the psalmist of old, seek the hills. It was always thus. In the Indian language Katahdin, "Kette Adene", means "the greatest mountain"—an object of awe and fear—the home of the devastating spirit of Pamola, the guardian spirit of the mountain. When in 1804 the Scituate surveyor, Charles Turner, Jr., first reached the summit from the Penobscot West Branch, his Indian guides resolutely refused to accompany him, saying that Pamola had destroyed those who ventured too near his fastness. The esteem in which Katahdin is held can be judged best by the extent of its literature, which comprises a bibliography of some 78 pages—a record believed to be unequalled for any other single peak in the United States.

Katahdin's preeminence—as with other things that suffer the misfortune of too close proximity to greatness—dwarfs the surrounding region. The majesty of this towering granite monolith so impresses the casual climber to its summit that, at the outset, he may fail to appreciate that Katahdin is merely the culminating feature or symbol of an outstanding region, justly deserving of high repute in its own right. On these features of the larger whole—almost encircled by the curving tributaries of the Penobscot River—has attention been focused by Congressman Brewster's bill. This will not be a park of one mountain or one lake. In the area of the proposed Katahdin National Park one may count 55 separate and distinct peaks and 68 lakes.

KLONDIKE POND, IN ONE OF KATAHDIN'S CIRQUES

In the background are the Brothers Mountains. Photograph by Ludwig K. Moorehead, courtesy of the Appalachian Trail Conference

As a type of North Woods wilderness the Katahdin region could well press a deserved claim to national recognition. Other sections of the ridge-crested Appalachian Chain rise to a more dominating height than does Katahdin but none possess its infinite variety of lake and stream. The uniqueness of the region may be ascribed directly to a master architect—the continental ice sheet that stood down over New England eons ago.

The aftermath of this glaciation—in the form of sheer-sided granite basins, tableland, high lying ponds, moraines and Arctic flora—has made this entire region an endless joy and surprise to the most untutored as well as to him who reads here the record of the ages. What the shape of Katahdin was before the ice-sheet planed off the summit of this granite mass is a matter of vaguest conjecture. In the middle Nineteenth Century one school of geologists asserted that Katahdin had not projected above the ice sheet. At the end of the century, glacial geologist Ralph S. Tarr settled these doubts. The traveler along the crest of Katahdin will take keen interest in searching for the form of evidence with which Tarr set the controversy at rest by finding near the summit glacial erratics that are quite different from the granite of the mountain and which were transported from the north by the glacier and deposited when it overrode the summit of Katahdin. Of a later origin were the local glaciers, which departed from Katahdin only some 15,000 years ago, after they had cut deeply back into the granite mass, carving out the steep-walled cirques or basins on every side of the mountain. On its east side, where the mountain resembles a series of linked volcanic cones split lengthwise, are three basins, Great or South, North and Little North. From the ponds at the bottom of these basins, rimmed above by a narrow encircling crest known as the Knife-Edge, sheer granite walls rise 2000 feet. Here is a transplanted bit of the High Sierra in the superlative. On the west side of the mountain are other ravines of glacial origin. In the Northwest Basin, on a high-lying shelf, are four ponds. At their outlets are curious instances of glacial scouring—two *roches moutonnées* or sheep-backs, as these elongated dome-like rocks are called. Nearby is another tarn, Klondike Pond, in a narrow sheer-walled slit; first reported half a century ago, it was re-discovered only in 1922. Stretched across the mouths of these cirques or basins—and a source of exertion to those who would reach the interior basins beyond—are glacial moraines, irregular rows of debris pushed outward by the glaciers and forming ponds at the mouths of these basins.

The summit of Katahdin is a considerable surprise to him who climbs it for the first time, expecting to find the narrow ridge crest, as seen from below. It is a "tableland", some six miles long and two miles wide, covered with irregularly-shaped broken granitic slabs, trending down from the highest part of the mountain. Near the summit is an instance of the interesting phenomenon of "rock

WHERE THE APPALACHIAN TRAIL MAKES ITS START

Extending 2056 miles to Georgia, this great trail is a hikers' achievement. Mr. Avery holds the measuring wheel. Photograph by S. S. Philbrick

creep". The southern portion of the mountain mass of the Katahdin area is granite, formed deep under the heavy overlying mass of rock long since eroded; the northern part is rhyolite. Somewhere, buried under the glacial debris and as yet undetermined by the geologists, is the contact point between these rocks.

As the geological past of the Katahdin country has wrought its outstanding characteristics, so have resulted its botanical features. Katahdin's flora is an Arctic island, a relict of the vegetation that followed the retreating glacier northward. On the Tableland are dwarf spruce, fir, willow and white birch, prostrate from battling the storms of years, scarcely thicker than one's wrist, yet many many decades in age. Some of the scientific names of the commonest plants tell significantly of their present habitat—thus *Arenaria groenlandica* and *Diapensia lapponica.* As characteristic of the North Woods summits as are the "balds" of the southern Appalachians, is the dense spruce and fir "scrub". Of this Henry D. Thoreau wrote in the story of his ascent of Katahdin in 1846:

> Leaving this at last, I began to work my way, scarcely less arduous than Satan's anciently through Chaos, up the nearest, though not the highest peak, at first scrambling on all fours over the tops of ancient black spruce-trees (*Abies nigra*), old as the flood, from two to ten or twelve feet in height, their tops flat and spreading, and their foliage blue, and nipped with cold, as if for centuries they had ceased growing upward against the bleak sky, the solid cold. I walked some good rods erect upon the tops of these trees, which were overgrown with moss and mountain-cranberries. It seemed that in the course of time they had filled up the intervals between the huge rocks, and the cold wind had uniformly leveled all over. Here the principle of vegetation was hard put to it. There was apparently a belt of this kind running quite round the mountain, though, perhaps, nowhere so remarkable as here. Once slumping through, I looked down ten feet, into a dark and cavernous region, and saw the stem of a spruce, on whose top I stood, as on a mass of coarse basket-work, fully nine inches in diameter at the ground.

Since 1804, mountaineers have been drawn to this region. Its frequenters comprise a distinguished list, names renowned in American literature and scientific history: Edward Everett Hale (1845), Henry David Thoreau (1846), Thomas W. Higginson (1855), Theodore Winthrop (1856), Charles H. Jackson (1837), Jacob W. Bailey (1837), Charles H. Hitchcock (1861), Frederick E. Church (1877), Charles E. Hamlin (1867-87), and scores of other names less known, but renowned in scientific circles.

Thoreau's account of his ascent in 1846 and his journeys in the Maine wilderness are classics of outdoor literature, a fount that has not yet gone dry.

Well known is Theodore Winthrop's exuberant story of his canoe journey down the West Branch to climb Katahdin, and his characterization: "the best mountain in the wildest wild to be had on this side of the continent". Frederick E. Church, a leader of America's outstanding school of landscape painters, made at least four visits to Katahdin and was so drawn to the region that he established a camp on the shores of Millinocket Lake. Apart from his better-known paintings, the Cooper Institute in New York City has some 42 of Church's Katahdin sketches. So have the constantly increasing number of visitors to Katahdin echoed the approbation that these noted personages recorded. All this renown, however, has served only to accentuate the wildness of the region; it is still as difficult to penetrate many sections as it was in 1804.

SOME ROCK WORK ON THE TRAIL

This is a bit of the Appalachian Trail over the boulders of Hunt Spur on Mount Katahdin. Photograph by Mark Taylor

Around the base of the Katahdin plateau flow the branches of the Penobscot River, long famous as wilderness canoe routes. The East Branch, with its falls and rapids, is a gruelling test for the most skilled canoeman. At its headwaters, and within the proposed park limits, are the two Grand or Matagamon Lakes, lying under the beetling cliffs that form the northern limit of the Katahdin mountain area. To the south, and forming a park boundary, is the West Branch, a widely-known canoe cruise with its six repetitions of the dead-water, then the falls, then the stream emptying into the river, so carefully noted by Thoreau, in Nesowadnehunk, Abol, Pockwockamus, Debsconeag, Passangamet, and Ambejijis. Nesowadnehunk, or "Sowdyhunk" as the woodsman terms it, was "stream running between mountains". Likewise, Aboljacarmeguscook, another of these tongue-twisting Indian place names, meant "place where the water

laughs in coming down", while Wassataquoik, reputed to be the wildest stream in the state, was "place where salmon are speared by torchlight".

Nearby to the north is the Telos Cut, where, one hundred years ago, enterprising Yankee lumbermen connected the Allagash and East Branch waters, altering an extensive drainage system, changing the course of rivers and resulting in narrowly averted international complications. At Nesowadnehunk Falls occurred one of the picturesque epics of Maine's long logging days, when inspired by the thrill of doing a "beeg t'ing", the Indian, Big Sebattis Mitchell, performed the hitherto unaccomplished feat of running a bateau over these falls; then to meet this challenge, which their pride could not brook, a Penobscot "white" crew of four painfully carried their bateau back, to run the falls with a loss of two river-drivers and the boat. Mrs. Fannie Hardy Eckstorm, famous Maine author, tells this incident in *The Penobscot Man*—the story of that picturesque type, the river-driver, at his best in white water or where danger threatened.

KATAHDIN FALLS

Lakes and streams abounding in fish and rich in natural beauty are found in the Katahdin country. Photograph by Sawtelle, courtesy of the Appalachian Trail Conference

Katahdin is well known to mountaineering clubs in another connection. It is the northern terminus of the 2050 mile Appalachian Trail, the white paint blazes of which lead for 266 miles through the Maine wilderness.

So much for the peak Katahdin, from which we turn to its satellites and the surrounding Katahdin region. The extent of the mountains in this area is a distinct surprise to the traveler who approaches from the age-old West Branch route or the more recent route from Millinocket. Seen from the south, Katahdin is a huge, uniform, undulating rampart wall. At the summit this impression vanishes. To the north two parallel ranges extend toward the level lands of the Penobscot East Branch Valley; of these ranges Katahdin is merely the culminating peak. Viewed across the flat tableland, an enormous L-shaped range extends first west, then north, until lost on the horizon. "To the Indians," Moses Greenleaf, Maine's first map-maker, wrote in 1829, "this was the Katahdinauguoh—the cluster—of mountains about Katahdin." Between this range and Katahdin, completely enclosed, is a high elevated spruce and fir flat, the Klondike, so named because of its utter wilderness by a famous Penobscot Indian, Joe Francis, who ventured there to hunt moose. Few have traveled in the Klondike; one speaks of it in hushed tones with a semi-reverence.

Briefly we note the outstanding peaks of these ranges. Nearest, on the western arm of the Katahdinauguoh, is The Owl, separated from Katahdin by an enormous ravine with sheer cliffs, the densest of scrub and a "pasture" of grassy vegetation near its summit, at so precipitous an angle as to seem likely to slide into the ravine below. Beyond the long crest of the densely-forested Barren Mountain is O-J-I, whose name, lettered by slides on its slope, has been badly distorted by the storm of September, 1932. Beyond, across the gorge of Nesowadnehunk Stream, rise the twin cones of Doubletop, with its slide-seared sides. Seen up Nesowadnehunk Valley, Doubletop is a Fujiyama—a perfectly proportioned cone. A low tower on its summit, one of some 75 in the state, bears token to the relentless battle that the Maine Forest Service wages to preserve its wilderness against the ravages of fire.

At O-J-I, the L-shaped Katahdinauguoh turns sharply north. Next are the Three Brothers, a balanced triad of 4000-foot peaks, so conspicuous from the summit of Katahdin. An outlying spur, Fort Mountain, walls in the northern end of the Klondike. This peak, which owes its name to its characteristic shape as described by Katahdin's first explorer in 1804, suggests a puzzling query. Turner wrote of it: "called by the English, Fort Mountain, from its shape". Who had been there before Turner?

Beyond the glistening cone of Mullen this range is lost from view, but beyond is a host of mountains. Between the cliffs of Wassataquoik and Pogy Mountains lies the long narrow Wassataquoik Lake, the superb setting of which, with the nearby two South Branch Ponds, is unequalled in the state. Black Brook, Black Cat and South Branch Peaks comprise the northern end of this range as it dies out near the shores of Second Grand Lake. To the west are the picturesque Nesowadnehunk Lakes and several isolated forested peaks.

The second range parallels the other except for the latter's westward turn. It commences with the massive bulk of Turner with its tableland and glacial cirque, with its Twin Ponds. At its southern base lies Katahdin Lake. The view over this lake into the open basins on the east side of Katahdin leaves an indelible impression—perhaps the finest conception of the majesty of the range. The culminating peak of this range is The Traveler, with its six bare summits and far flung spurs, walling in Pogy Notch, a beaver-infested flat suggesting the Klondike. The Traveler owes its name to the fact that to voyageurs down the East Branch, it seemed as if the mountain "traveled" with them. North from The Traveler is the

group of cone-shaped glistening rhyolite peaks which, as he emerged in 1857 from the forest over the dark waters of Grand Lake, had so impressed Thoreau. From "Joe Polis", his Indian guide, Thoreau's questing mind gathered the erroneous information that the Indians knew these as the Nerlumskeechticook or "Deadwater" Mountains.

So much for the myriad mountains, lakes and streams of the Katahdin country, intriguing the mountaineer, hiker, camper and canoeist. Its ponds and lakes—many beaver-formed—teem with brook trout. In the larger lakes are the "lakers". South Branch Ponds—demanding perfection in fishing technique—have landlocked salmon. Nesowadnehunk Stream is a famous dry-fly locality.

The Katahdin region has been a game preserve for some fifteen years. The meeting, even on the approach trails, of the black bears, which feed on the blueberries, is a common experience. Moose, deer, beavers and smaller mammals are numerous. Formerly caribou herds roamed the tableland, leaving the faint trails through the scrub that survived the "migration" of the caribou from Maine. This animal was last seen and *photographed* at Katahdin in 1905 by Roland B. Dixon, Sinclair Kennedy and Arthur W. Stevens. What caused the caribou to leave Katahdin is an unanswered question. Under federal ownership of this region, the caribou might be brought back.

The future of this unparalleled region without the safeguard of adequate supervision, properly planned development and facilities for those lured there by its fame, has been a matter of grave concern to those who know the land. These problems have come close to, and in the future, unless a laissez-faire policy ends, inevitably will produce, irreparable injury. This must not occur.

The first forward step came in 1931 when Percival P. Baxter, long sponsor of a movement to make Katahdin publicly-owned, gave to the State, in 1931 and 1933, a strip of some nine square miles, comprising the top of the mountain. This is the present Baxter State Park. Subsequently, with the creation of other National Parks in the East, there has developed a realization that Katahdin is only the culminating point of an unparalleled region. Ex-Governor Baxter has indicated the way. But the mountain top is not enough nor is the ownership of the mountain by the state alone a solution of the difficulty. An area of National Park standards is here and should be preserved. The problems require the facilities of administration peculiarly developed and maintained by the National Park Service. These problems and their manifest solution have been fully realized by Congressman Brewster, who has come to know the region well since his first climb of Katahdin in 1925, while Governor of Maine. The proposal to make the Katahdin region, the outstanding region of the East, a National Park, should command the support of all those who wish the heritage of the American people to remain undiminished.

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Things to Think About

Although it looked dark for a time, in the closing hours of the recent session of Congress money was appropriated for the acquisition of 7200 acres of sugar pines for addition to Yosemite National Park. (Nature Magazine, September, 1937, P. 167.) This acquisition, previously authorized by Congress, was to have been made from unused funds earlier appropriated. It was found that these funds were not available for land acquisition, so the appropriation was included in the third deficiency bill. The item was eliminated in the House through the action of Mr. Englebright of California, but was restored to the bill in the Senate, in which restoration the House finally concurred.

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It is with regret that we record the failure of an appropriation by Congress that would have completed the purchase of the remaining area designated for inclusion in Smoky Mountain National Park. This Park is still in what is known as "proposed" status, and if ever an area merited being placed on an official basis this does. Superintendent J. Ross Eakin has done an outstanding job of organization in the face of difficulties, and with a skeleton staff has handled an amazing number of visitors, undoubtedly to total more than 700,000 this year. The popularity of this glorious region is still growing and additional facilities in the way of permanent camp grounds and the like are vitally needed.

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The last Congress approved a measure to provide approximately $3,000,000 to assist the States in setting up "wildlife restoration projects." Under terms of the bill, the Government will set aside an amount equal to the revenue accruing from the tax on firearms and shells, this fund to be known as "The Federal aid to wildlife restoration fund." The bill further provides that State Game and Fish Commissions desiring to avail themselves of the benefits of the act will submit to the Secretary of Agriculture details of wildlife restoration projects proposed. If these plans are approved, the Treasury will earmark funds, such amount not to exceed 75 per cent of the total estimated cost, as the Government's share in the project. If projects thus completed are found not to be properly maintained by the State, the Secretary of Agriculture has power to refuse further aid until the project is put in proper condition of maintenance. It is difficult to see how our wildlife is going to benefit materially from this device any more than it does from the duck stamp. It is just another case of placing a benediction on killing because the use of arms and ammunition produces a small amount for restoration. If, in this vicious

circle, restoration could catch up and pass destruction, there might be some hope. But it doesn't.

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Typical of the wildlife misinformation all too frequently given wide circulation in the feature and news columns of newspapers is a recent illustrated feature in the *Seattle Post-Intelligencer*. The article dwelt at length and without regard to scientific fact on the great damage being done at the State game farm by owls. The authorities at the farm were quoted as delighted that the arch-villain, the barn owl, had been dispatched because it was damaging the pheasants. Analysis of the stomach contents of this barn owl revealed nothing but the skulls of moles, and there was not a feather in the whole animal save those on the outside. They were his own.

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What is hoped will be a boon to the wildlife of the south is the establishment of the Okefenokee Wildlife Refuge, Georgia. The 479,450-acre tract, a vast primeval wilderness in the swamp of the same name, will be maintained as a sanctuary by the Biological Survey. Hunting and trapping will not be permitted, but regulated fishing will be allowed in certain sections.

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Four years ago a pair of mallard ducks swooped down and settled on one of the large lily lakes owned by the Liebhardt brothers of Denver, Colorado. The female laid two eggs, and from them hatched a male and female mallard. Although the mother was found later with a bullet in her body, the young ones reached maturity safely, and next spring the female returned six weeks earlier than the male, laying nineteen eggs. The owners of the property posted the land—"Private grounds, no hunting" —and today *more than four hundred ducks,* many of which are descendants of the original pair, live in safety on their refuge. These facts, sent to us by L. F. Liebhardt, Rose Acre Gardens, Denver, are recorded here because they further substantiate our contention that the opportunity for natural increase of our duck population offered at this sanctuary would operate similarly for our ducks in natural habitat if the barrage of bullets was stopped by a closed season.

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Wildlife G-men, the game-management agents of the U. S. Biological Survey, have been instructed to be on the lookout for cage traffic in native migratory birds. Recent investigations have revealed there is considerable traffic, particularly in those birds that migrate between the United States and Canada or Mexico and are protected by international treaties with Great Britain and our southern neighbor. The Migratory Bird Treaty Act regulations do not authorize the sale or purchase of live migratory nongame birds by dealers and others unless they are holders of scientific permits. The Biological Survey has announced there are probably a number of dealers in birds not familiar with the regulations and that they are "not disposed to molest" persons holding caged birds that were added to the protected list by the Mexican treaty of last March if they obtained the birds before the treaty went into effect. The Survey, "recognizing that there are probably a number of dealers in birds in this country who may not be familiar with both treaties", is making every effort to supply detailed information. They point out, however, that appropriate action will be taken against anyone deliberately failing to comply with the law *after* having been informed of it.

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Recognizing the importance of restoration of cover and food conditions for wildlife, the State of Wisconsin has established a nursery capable of producing several million trees, shrubs and vines annually for this purpose. State nurseries in the past have concentrated largely on production of forest trees for reforestation programs. Drained and burned-over areas, however, have created conditions untenable by wildlife, and recent experiments in producing nut and berry-growing trees and shrubs have warranted large-scale nursery planting and production.

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More than twelve thousand acres of tidal flats and marshes adjacent to Delaware Bay in Kent County, Delaware, have been set aside as the Bombay Hook Migratory Waterfowl Refuge. This brings the total of refuges along the Atlantic Coast to seventeen. This refuge is on the migration routes of the black duck, pintail and green-winged teal, as well as other species of waterfowl.

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In the words of John W. Studebaker, United States Commissioner of Education, conservation of our natural resources is one of the most significant social problems with which we are confronted today. Many Government agencies and private organizations are spending millions of dollars annually on conservation activities in an attempt to remedy the effects of years of exploitation and neglect. Mr. Studebaker, in his foreword to *Conservation in the Education Program,* published by the Office of Education, Department of the Interior, praises those schools that have introduced conservation into the school program. He asserts that organized public education offers "the best, if not the only, means of ultimately and fully accomplishing this purpose." The new pamphlet, prepared by William H. Bristow, General Secretary, National Congress of Parents and Teachers, and Katherine M. Cook, Chief of the Division of Special Problems in the Office of Education, will provide school officials and other interested parties with information concerning progress already made in introducing conservation into school programs and stimulate further progress through a description of the types of instruction that have been successfully followed by a number of schools. The pamphlet discusses the importance of conservation as a national policy, and many details that must be considered before conservation, either as a subject or an activity, can be introduced into the school program. The social justification for the unit and the relation of the unit to courses in elementary and high schools is set forth together with a suggested outline for teaching. The pamphlet is available from the Superintendent of Documents, Washington, D. C., for ten cents. Ask for Office of Education Bulletin 1937, Number 4.

TWO BEAUTIES OFTEN OVERLOOKED IN GARDEN PLANNING

Above is pictured one of the fascinating species of *Fritillarias*, the checkered lily, growing in the author's wall garden. Below is an overlooked narcissus, *N. triandrus*, known as Queen of Spain. This particular clump was naturalized in a woodland planting

Flowering Bulbs Often Overlooked

By VICTOR H. RIES

Photographs by the author

MANY readers of Nature Magazine may wonder why these articles are concerned exclusively with bulbs. I will tell you—I like the flowering bulbs, and liking them, I grow them in my own garden. Also, this is the time of year to think about bulbs. Being rather heavily shaded by five large red oaks, my garden does not lend itself to many of the annuals and perennials. But most of the bulbs, especially the spring-flowering ones, may be grown in a shaded garden for they have completed their performance before the trees are completely in leaf.

You too, once you start growing any one type or kind of plant, whether it be rock plants or lilies, ferns or annuals, are going to become interested in them and try to grow more and to find new ones. But to get back to the bulbs themselves:—which are the overlooked ones? Possibly you think we have mentioned all of them in the two previous articles.

There are so many it is really difficult to know where to begin—so let's start with the *Allium*—the onions. There are a dozen or more offered in various catalogs

FIND A SPOT FOR THE GRAPE HYACINTH

The bright flower of the Heavenly Blue against the mossy gray of limestone soil is a delight to the eye

either as bulbs or as seeds. Although not as showy as some other flowers, they usually are permanent and can be tucked away in an odd spot between slow-growing plants for a bit of late spring, or early summer bloom. They are yellow, white or pink, depending on the variety.

The species of *Tulipa* are especially intriguing, blooming as most of them do long before the so-called early tulips. The lovely Kaufman tulip, with its creamy-yellow flowers flushed with red, is one of the best of the wild ones. Incidentally, several varieties of the Kaufman are available with larger flowers and of varying color from white to yellow. The Lady Tulip, *Tulipa clusiana,* is fairly common, but even so, it is not as widely grown as its daintiness warrants. For a gorgeous color, blooming a few weeks later is the brilliant red *Tulipa eichleri.* Less showy but unusual in color is *Tulipa persica* with its several yellow and bronze flowers on one stem, similar in size and daintiness to *clusiana. T. fosteriana* is a vermillion-scarlet somewhat similar to *eichleri* but blooming later, when early tulips are in bloom. All in all, there are twenty-five or more species listed in American catalogs, and they are all worth trying even if you get only a few of a kind.

Mention crocus and most people think of the common Dutch crocus with its long flowers of blue, white, purple, lavender, or yellow. But few realize that there are a dozen different fall-blooming species, and even more species flowering in spring. Try using them in the rock garden around the pool, above a wall, in fact almost any place you can plant bulbs. Here again a nice little hobby for the collector of garden plants.

The western species of *Erythronium*—commonly called adder tongue—are lovely with their graceful flowers of pink, yellow, red, or lavender. In some localities they are hardy and permanent; in others, including my own garden, they are rather transient—a few linger on; far more disappear—yet by all means you should try a few.

In the same category are the gorgeous mariposa lilies, or *Calochortus,* of our western states. Even if they bloom only once you will feel repaid for trying them. The smaller-flowered form, or kittens' ears, are not as showy, but equally fascinating.

Quite the opposite is the so-called grape hyacinth, or *Muscari,* found native in moist woods in the eastern United States. The variety *leichlini* is larger-flowered and stiffer-stemmed than the native and they do well in wild garden or low spot.

The grape hyacinths have been recommended in the two previous articles but may we now suggest in addition to the common ones the delightfully airy plume hyacinth as well as some of the species such as *comosum, armeniacum, moschatum, neglectum.* But do not be misled into planting the old-fashioned Star of Bethlehem which becomes a pest that is difficult to eradicate.

The striped squill or *Puschkinia* is similar to the Siberian squill except for its pale blue flowers. The snowflake, or *Leucojum,* with its drooping white flowers with green-tipped petals, always attracts attention in the vigorous clump it develops. The flowers have long enough stems to be used for cut flowers.

The bulbous irises, although being used more commonly than they were, are still not grown as much as their worth warrants. Not as hardy as some other bulbs, they should be planted eight to twelve inches deep in a well-drained soil in those localities where ground freezes. The Spanish, Dutch and English may be used for this purpose. Nor should we pass by that miniature iris with fragrant bloom—*Iris reticulata.* It should be given some winter protection.

It may seem out of place to mention narcissuses among the neglected bulbs, but there are some forms that are unquestionably so. For instance, we but seldom see the *Triandrus* hybrids in the garden. To be sure, they are not as cheap as some but are worth their price in the enjoyment you will receive the first spring. Among the varieties in this group are Agnes Harvey, Moonshine, Thalia, Pearly Queen and Mrs. Alfred Pearson.

There are a number of species of daffodils which are small but intriguing, such as *Bulbocodium, Cyclaminum, Jonquilla simplex,* and *Triandrus,* Queen of Spain. The *Cyclaminum* hybrids—February Gold and March Sunshine—are both rich colors.

The trilliums or wake robins are another group you will enjoy trying. By growing the dozen or so species that are native in various parts of the country, you will be the envy of your fellow gardeners. There are several firms that handle the western species (Continued on page 254)

Old Wives For New

By "OF THEE I SING"

Illustration by R. Bruce Horsfall

Poppa Grosbeak stood in the doorway of the bird-banding trap hiccupping his displeasure. To compel a fellow to court the lady who had already mothered his children—albeit in a previous year—was "rubbing it in", according to Poppa's sense of justice; which, no doubt, was largely influenced by the condition of his feet. Poppa was tired as well as displeased. Within the trap, a sleek, drab-brown, striped individual carefully selected a fat sun-flower seed and as her ponderous beak crushed the shell there came a crack that spurred Poppa into instant action. His head feathers rose while his wing feathers drooped, and lifting up his golden voice in praise of his lady, Poppa swayed back and forth across the trap doorway on tired feet that danced—and danced.

That dance, combined with a small portion of Poppa's history, throws a revealing light on a subject that has long intrigued me. So let's delve into Poppa's past and find out what manner of lad he used to be in bygone days.

In the spring of 1934, a strikingly handsome rose-breasted grosbeak alighted on the big glass feeder. His rich coloring proclaimed him to be a male of some three or more years, but that being his first visit to this station, of course he wasn't then known as "Poppa". However, a few days later, he did own a name of sorts, for I trapped him and clamped on his left leg a metal bracelet bearing the number 34-235617. Somehow, Poppa's 1934 bride remains a shadowy personality. His triplets, however, were always noisily in evidence. Greedy and ungrateful, his two sons and their sister made their father step so lively his sleek coat soon frayed out rusty, though his parental devotion endowed him with a shining grace. Thus did he become "Poppa," and only the banding records list him as a mere number.

"STANDING SHOULDER TO SHOULDER WITH HIS HEART'S DESIRE WAS POPPA."

Among other grosbeak youngsters coming daily to feed in the yard that summer, I banded a charming little girl; though hard to believe, the very same little girl who, in later years, was to create an even greater furore in Poppa's life than the terrible triplets. But at that time, she irritated him solely through the nerve-racking reactions of his own children, who wailed like banshees whenever they saw her—or each other—getting anything to eat. When Poppa went South that fall he certainly needed the change.

Came another springtime that found Poppa making eyes at a sweet, drab-brown damsel whose banded left leg soon yielded the amazing information that here was the charming little girl all grown up and already the light of Poppa's life. Three other gentlemen grosbeaks felt just as Poppa did about her. The quartet, while individually hating each other, took turns in singing and dancing by the hour for its stoically unappreciative audience. Guerrilla warfare finally wound up in one grand "hand-to-hand" conflict in which considerable fine plumage was forcibly thrown to the winds. Then Poppa and his youthful bride (oh yes! Poppa got her!) vanished for several weeks. Perhaps Poppa was ashamed of himself for thus inveigling the affections of a child young enough to be his granddaughter. But though Poppa was ever a heart breaker, he was a devoted husband, too, and before going South for the winter he showed me two very fine children, the absolute images of "Mother".

I was overjoyed to see Poppa again, this spring, and when Mother showed up a few days later I looked for some interesting developments; rosebreasted grosbeaks being one of the species commonly supposed to prefer a change in partners each spring. Yet here they are—Mother in the trap eating, as usual, and a disgruntled Poppa striving hard to win the favor of his last year's wife as if she had never been a wife at all and were a brand new choice from this season's crop of debutantes.

It was plain to see from Mother's rising war-locks that Poppa's vocal selections didn't jibe with her state of mind. Or at the moment, perhaps music didn't set well with her meal. Anyway, something was irritating Mother. Savagely crushing a seed she gulped the kernel then spun around suddenly and faced the caroling Poppa. Opening her stubby beak wide, she leaped at him with lowered head and malicious intent. Like the veteran he is, Poppa nimbly side-stepped his riled lady and with rare good judgment he beat it around the farther end of the brush-pile until she should be in a somewhat more receptive mood.

Fifteen minutes later, a golden warble again broke out near the banding trap. There was Poppa with his ardor undiminished, gamboling around the end of the bird bath. Floundering over a low stone wall he bounced down into the driveway, and without an instant's pause, retraced his troublous way back to the bird bath. Several

times he thus danced back and forth over the same difficult route before I spotted the focal point on which his eyes were fixed regardless of where his feet might stray.

Six feet away, parked under a huge leaf that served her as an awning, was Mother. As usual, she was eating. For the next quarter of an hour she continued to eat, gazing with keen enjoyment on everything but Poppa, who was dancing callouses on his toes and wearing his wings and tail into shreds. It was to be the hottest May 18 in forty-eight years; and it nearly finished Poppa! Between the burning love in his heart and the blazing sun on his head, Poppa was blowing like a blast furnace. But what cared Mother?

Spitting out the last husk without so much as a glance at the suffering Poppa, Mother lit out for the dim, cool woods. Discordantly hiccupping his rage and despair, but with his eyes still fixed unwaveringly on his heart's desire, Poppa streaked after her.

The fact that practically all the other grosbeak ladies in the neighborhood had gone to house-keeping didn't fluster Mother a bit. She was taking her own good time arranging her own affairs and four days later found her still putting Poppa through his paces. Settled cozily in the bird-banding trap, Mother was eating, as usual, while Poppa ingratiatingly trailed his wings and tail back and forth across the doorway.

Though Poppa's spasmodic warble betrayed a sad state of nerves, his enamored eyes never left Mother's sleek, drab-brown head. Heretofore its rising war-locks had all too often spelled disaster for Poppa's hopes. Minutes passed. As Poppa continued to behold those miraculously low-lying tresses, his own sable locks jubilantly stood on end.

Jauntily perking up his drabbled wings and tail, a gallantly handsome Poppa cautiously stepped through the doorway. And then I saw a most unusual sight! Standing shoulder to shoulder with his heart's desire was Poppa—eating!

•

NEW WATERFOWL REGULATIONS

As NATURE MAGAZINE predicted in July, the Department of Agriculture has authorized another season of waterfowl shooting. This is allowed despite the warnings of the Nature Association, the National Association of Audubon Societies, many conservation and sportsmen organizations, and the protests of thousands of lovers of birds, and of fair play.

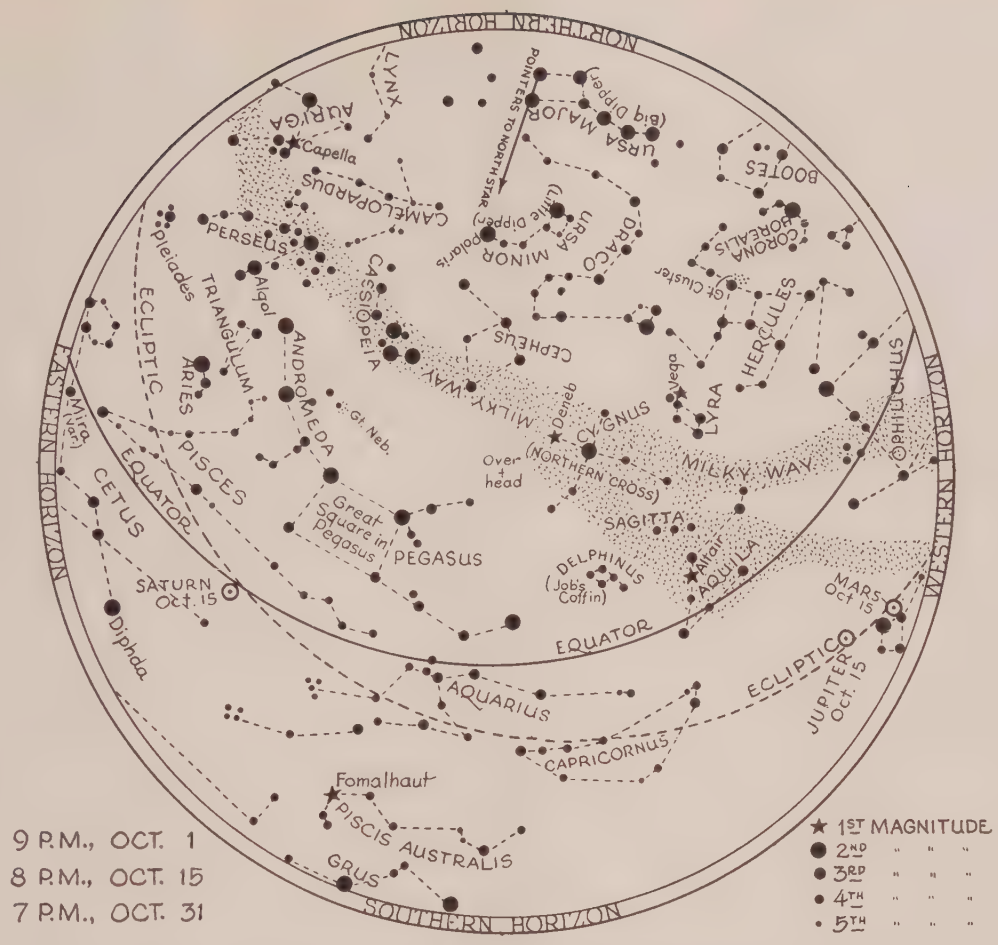
The season allowed for shooting in any part of the United States and Alaska is to be thirty days, but the division of the country into six overlapping zones insures that many thousands of waterfowl, including a majority of the species, will be subjected to a potentially continuous bombardment from September 1 to December 26. Regulations for Canada, not at hand at this writing, may reasonably be depended on to make this statement applicable to the entire continent. Canada, in any case, by producing most of the waterfowl and by shooting but a small proportion, always gets the smaller end of the waterfowl bargain.

It would be tedious and profitless to discuss in detail the intricacies of shooting zones and seasons, bag limits and other minutiae. A few highlights may be discussed.

In the Department announcement we can find no reason for allowing another open season on these disappearing birds except the statements that "reports this summer indicate that for the second year in succession there has been a noticeable increase in most species", and "the slow but steady increase noted last year appears to be continuing". These statements, devoid of all details, and guardedly qualified, are not reassuring to the discerning student who is fearful of the future of our waterfowl. No attempt is made to estimate either waterfowl population or kill, or to indicate what species appear to be increasing. The Department can hardly mean the Ross goose, wood duck, ruddy, canvasback, redhead, bufflehead or either of the swans, for these are still given full protection. On geese and brant that are allowed to be shot, the daily limit is increased from four to five. If these be the species that seem to be registering a slight increase in population the fact is interesting, but it should not be made an excuse for the infliction of a twenty-five per cent larger kill. Furthermore, these nest chiefly beyond our borders, and cannot owe any perceptible increase to breeding sanctuaries. Perhaps (although this is hard to believe), the mallard and other shallow-water ducks are the ones that have benefited, but this can hardly be so, since they have lately had to bear the brunt of the shooting. We fear that only the lowly coot still survives in safe numbers, for we note that the daily limit on this near-waterfowl has been increased from fifteen to twenty-five. The coot raises a large family, its flesh, despite its advertisement, is doubtfully palatable to most sportsmen, and in some parts of the West it seems to be taking the place of the ducks that in earlier years were an important part of our fauna.

We crave the Department's pardon for appearing to wax imaginative, but the information vouchsafed us permits the exercise of no mental faculties save imagination and doubt. We must use these, or be silent.

The appalling failure during 1936 on the part of thousands of gunners, in different parts of the country, to conform to necessary restrictions, revealed by independent studies, is not alluded to by the Department, and apparently has formed no part of its reasoning, for "Survey officials . . . consider the present gains due to success in reducing the annual kill, through stringent regulations that have been supported by the large body of sportsmen". How anyone with full knowledge of the atrocious defiance of law and the waste that attended the last open season can so ignore its significance is a mystery. We consider that the Department, by permitting an open season on waterfowl at this time, has committed a serious breach of its duty as sworn custodian of this valuable resource.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Telescopic Transportation to the Moon

The moon has been the object of much study by the big observatories, but to the amateur astronomer with a moderate-sized reflector it still can be a fertile field for new discoveries

By ISABEL M. LEWIS

FOR THOSE who are interested in astronomy as a hobby and have, in addition, a moderate-sized telescope, preferably a reflector, there is no more fascinating object for study than our own satellite. Even if one has only an opera glass and not much time to devote to the subject it is surprising how many interesting facts one may pick up concerning this world of riddles. There are so many things that we do not know about the moon, so many unsolved puzzles, that even the amateur astronomer may contribute his mite to the sum total of knowledge and discovery to which so many have already contributed in this field of astronomy.

One who starts on a voyage of discovery and exploration on the moon should first provide himself with some of the excellent maps and photographs of the moon that are so easily obtainable. Elger's *The Moon,* W. H. Pickering's *Photographic Atlas of the Moon,* and *The Moon,* by Walter Goodacre, are among the books that everyone interested in the study of the surface of this satellite should know. By all means secure some of the unexcelled photographs taken with the 100-inch telescope of the Mt. Wilson Observatory and see what a wealth of detail on the lunar surface they reveal. A comparison of these photographs with others taken in the future will be of great value in cases of suspected changes in certain markings on the moon's face.

The beginner would do well to confine himself at first to the study of a limited area of the surface, best seen near the time of first quarter, as most observers will prefer to do their exploring of the moon before midnight, in general in the early evening. As objects near the limb of the moon are seen foreshortened and change greatly

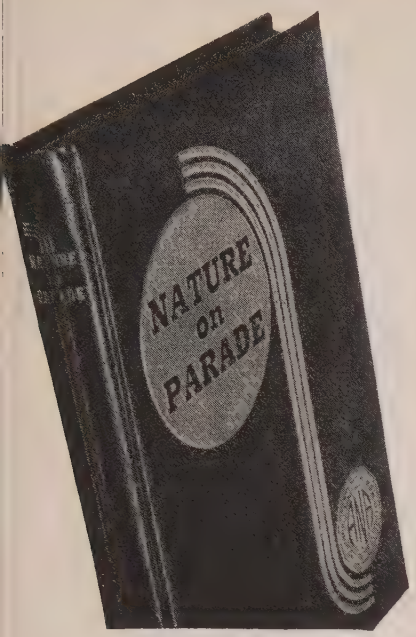
in appearance and visibility due to libration, or the apparent swaying of the moon due to various causes, it would be wise at first to choose objects at a considerable distance from the limb. An excellent region to explore at first, for example, lies near the center of the disk and includes within its bounds almost every kind of formation on its surface. Here will be found those intricate systems of lunar clefts known as the Hyginus and Triesnecker clefts on the borders of that grey expanse known as Sinus Medii, with craters and craterlets scattered over its surface. The ring-plain, Triesnecker, with a central mountain peak is also the center of a system of bright rays. On its west side are the noted Triesnecker clefts. In this region also is the great walled plain Ptolemaus, so great that it is like a small sea. This is one of the most interesting objects on the surface of the moon and its floor has been studied and charted more carefully and probably by more observers than any other object with the exception of the floor of Plato and the formation known as Linne.

One should not study the lunar surface without being supplied with a number of glass filters of different colors, and this brings us to the interesting subject of color and color changes seen on the moon. Groups of amateur astronomers have been devoting their attention to lunar color observations and a valuable article on this subject appears in *Popular Astronomy* for June-July of this year by Walter H. Haas. From the results of about five hundred observations made by a group of twenty-five observers with two telescopes, a ten-inch refractor and a six-inch reflector, he comes to the conclusion that colors other than black, white and grey exist on the moon, that these colors are subject to change and that they are not restricted to a few craters but represent a phenomenon affecting the entire moon. Here is a chance for a group of interested observers with small telescopes to do some exploring along these lines and make and compare notes. Colored sunglasses make good filters and aid in bringing out the various colors. It is an opportunity for interested amateur astronomers to do some good pioneering work in a comparatively new amateurs' field.

Another interesting field of lunar exploration has to do with the subject of change in the appearance of certain lunar features, and there are many such cases worth investigating. Prof. W. H. Pickering, one of the most widely known observers of the moon, has noted many instances of the appearance of haze or nimbus around various craterlets and volcanic vents and of a darkening of the floors of certain craters, notably that of Plato. It is a matter of general knowledge that the floor of Plato darkens gradually as the altitude of the sun increases. above its horizon from 20 degrees to after full moon; also that at times its surface is wholly or partially obscured by haze or mist resting upon it. Another interesting lunar feature that changes irregularly in appearance and about which much has been written by Pickering and members of the Lunar Section of the British Astronomical Association, and more recently by G. O. Rawstron in *Popular Astronomy,* is the strange little isolated mountain Pico which rises to a height of 8,000 ft. above the plain at a distance of about 50 miles south of Plato. One may easily identify all these lunar objects on any one of the numerous maps of the moon, many of which appear in star atlases. Pico has associated with it a most conspicuous white marking which spreads out from its northeast corner to a distance of some miles across the plain. This marking, which resembles haze, changes irregularly in brightness and extent and seems to have its source in spots that are on the mountain and that also undergo many changes. The most noted example of an object in which change is suspected to have taken place is the small crater Linne which Goodacre says has probably received more attention from observers than any other object on the lunar surface since 1866, when Schmidt declared it no longer conformed to the descriptions given by early observers. One who starts out to explore the surface of the moon will soon decide for himself what type of objects interests him most, craters, rays, clefts, mountains, or the so-called seas. There are still so many unsolved puzzles presented by all of these features that any careful study of the moon should yield something of value. Probably more would be accomplished than in any other way if one decided to concentrate on some one small region and become thoroughly familiar with it. Make that region your own. Learn everything you can about it. Find out, first, what other observers have written about it. Study all available photographs under as many different lunations as possible. Turn the telescope upon it, if you have one; if not, get someone interested who has one and work with him. Use color filters if you are interested in color changes. Keep a record of your observations and if possible compare notes with others who are also interested in the moon and some day you may discover something as a result of your explorations that may prove to be much worthwhile. At least you will have a fund of interesting information about our satellite.

Finsler's Comet, discovered on July 4 at Zurich, has been somewhat of a disappointment as a show object. It became visible to the naked eye in August near the Big Dipper and became as bright as a third magnitude star. Though it had, telescopically, two tails, neither was visible conspicuously to the naked eye and unless one viewed it far away from city lights it was difficult to find even when it was at its best. At its nearest approach in August it was about fifty million miles from the earth. Early in October it may be found as a faint telescopic object in Libra receding from the earth. Its distance on October 10th is about 200,000,000 miles.

Venus is still a brilliant Morning Star. Mercury will reach its greatest western elongation on September 30 and during the first week in October will be in a fine position for observation in the southeast before sunrise. Mars is now in the southwest in the early evening and moves rapidly eastward through Sagittarius during the month. Jupiter also is in the evening sky and is in quadrature on October 12 and in conjunction with Mars on October 29. Saturn is now in view practically all night in Pisces.



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The Making of a Scientist

Dr. Raymond L. Ditmars, in his newest book, *The Making of a Scientist,* recounts, in a particularly absorbing manner, his experiences with the diamond-backs of Florida, strange tropical frogs of Trinidad, of his quest for the giant bat and many other creatures. Especially entertaining are the first few chapters that, in autobiographical style, tell of his unsuccessful attempts, when a boy, to set up a miniature reptile house in his home over the objections of his parents, the neighbors and the health department. The author, always one to pry at the "why" of things, reveals how interesting and exciting it is to know why things happen rather than merely to see what is going on. One highlight of the volume is the chapter devoted to the author's intimate experiences with monkeys, in which are recorded a number of amusing stories about monkeys with personalities, strange tastes in food and startling habits. Priced at $2.75, *The Making of a Scientist* is available from the publishers, the Macmillan Company, New York.

Natural History Mysteries

The strange actions of some of our insects and lower forms of life have been attributed to both intelligence and instinct or a combination of both. E. L. Grant Watson, in his book *Mysteries of Natural History,* relates, in a most fascinating manner, some of these strange occurrences in Nature that seem to defy explanation. Wisely, however, the author makes no attempt to account for them, attributing them to neither intelligence nor instinct, but permitting the reader to take his choice or remain as much in the dark for the answer as are scientists today. One of the most interesting cases related in the volume is that of the butterfly, which, when in the caterpillar stage, allows itself to be carried off by an ant to the latter's underground home where it feeds on the ant larvae and later pupates. When it emerges as a winged creature, the ants do not attack it, but allow it to pass unharmed through the underground passages to the light. This is only one of twenty-four strange Nature truths incorporated in the book. Priced at $1.75, the volume is available from the publishers, Frederick A. Stokes Company, New York.

The Lore of the Lyrebird

The Lyrebird, always difficult to find in its native Australian haunts, has kept its mode of living and nesting habits somewhat of a secret from the prying eyes of scientists. Mrs. Edith Wilkinson, however, who resides hermit-fashion in the Dandenong ranges of Australia, had the remarkably good fortune of having one of these birds choose her for a companion and follow her about her yard every morning. This friendship has added greatly to the scientific knowledge of the habits and characteristics of the bird and the story of Mrs. Wilkinson's pet is told in book form by Mr. Ambrose Pratt, President of the Royal Zoological Society of Victoria, under the title *The Lore of the Lyrebird.* The volume, illustrated with many fine photographs of "James," the friendly visitor to Mrs. Wilkinson's cabin, is available from the publishers, Robertson and Mullens, Limited, Melbourne, for five shillings or about $1.25.

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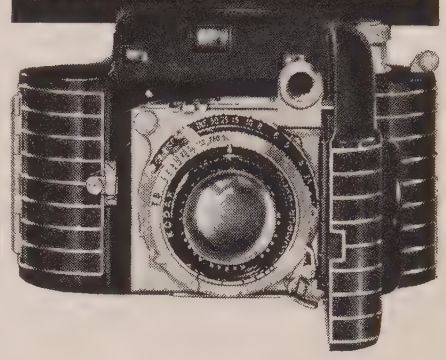

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Nature Magazine in School

A Department of Aid to the Teacher

October's Mad Moon

What active boy or girl has not felt the witchery of the October moon, culminating in the wild excitement of Hallowe'en? One can ask, do animals feel the magic in the air? Of course the wise teacher would not desire to leave her class with the idea that there is such a thing as magic, for, after all, for every effect there is a cause. However, one can play with the idea for the sake of the poetry and romance involved. Pupils can be on the lookout for birds and other creatures of the wild that act strangely, and report the behavior to the class. After several such incidents have been reported, interested individuals, mature enough to appreciate it, could be given this splendidly written article to read. They could select parts of the article to read aloud to the whole class. In the upper grades of the elementary school and in the junior high school, the subject of migration might be a natural outgrowth of this article. Teachers should be on the alert to collect questions that pupils ask regarding this subject; such as, do people migrate? What peoples have migrated? Why do they do this? Where do they go? Do animals follow the same routes? Does history show that peoples have followed certain migration routes? To find the answers to some of the questions pupils could be encouraged to read such books as Chapman's *Travels of Birds,* to observe flocks of birds, to listen for the calls of migrating birds flying high in the air, to bring some monarch butterflies to the school room in early fall, liberate them from a window and watch them fly away. Pupils could correspond with some school in the south asking them to record the date when they first saw monarch butterflies and when such birds as the house wren first appeared in the fall. They could reciprocate in the spring by reporting the arrival of some favorite bird of the school in the south.

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Protective Resemblance in Nature

Among many wild creatures the price of continued existence is concealment. Whether a creature deliberately or accidently copies another may be questioned, but it is generally agreed that there is such a thing as concealing coloration. Many creatures are difficult to see because of their resemblance to the background. By experimenting with colors, an object painted exactly like its background may disappear from sight. Another scheme for concealment is counter-shading, the upper part of the body being dark, the lower light. An Irish potato suspended above a background of the same color may be conspicuous. But if the lower shaded part be painted lighter the potato will be seen with difficulty, for the shaded part has been neutralized. A list of birds, mammals and fishes using this scheme can be made. An excellent example of this is the illustration of a brooding willet in the October issue of Nature Magazine. A third method of concealment consists in breaking up the contour of the outline, as is done when large objects are camouflaged. This is accomplished by the use

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science Washington, D. C., Schools

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of large patches of strongly contrasting colors, making dark and light patches. Thus it is that many brilliantly colored creatures obtain concealment.

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Mexico—Land of the Cactuses

When sombreros, panniers and Mexican pottery decorate the walls of your school room, and an adobe house occupies the back of the room, the atmosphere of old Mexico envelops your class. Cactuses would be a worthwhile addition to the picture. Large sheets of construction paper fastened to the wall back of the house could feature a desert scene painted by members of the class. Between this scene and the house, there could be a section of living cactuses and real sand, and the floor could be protected by a section of old metal roof laid under it. Cactuses require little care and these living plants would add a touch of genuineness to the setting. This article describes a number of varieties from which a selection could be made. Pupils could write to several dealers in these plants to find out which one would give them the best price. Selecting the varieties, writing for prices, ordering and planting would constitute real problems out of which the teacher could find opportunity for experiences in science, arithmetic, history, geography and English.

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Geological Wonders of Saratoga Springs

The geological history of a region makes a fascinating story. Geology determines what the geography will be, and this in turn greatly modifies its history. Just as the author of this article has searched out the geological history of Saratoga Springs, it would be a worthwhile project for a junior high school class to find out about the formation of its own locality. Such a unit of study might evolve from questions regarding rock specimens collected in the vicinity, from reading this and similar articles describing the formation of other regions, from questions asked by members of the class, or from problems arising in social studies. As interest in the subject became manifest, many questions would be asked. The teacher should keep a record of these questions because it is through them that her pupils may be le into the subject. Many state agricultura colleges are in a position to provide muc information regarding the geology of partic ular territories in the state. The severa counties in a state could combine the result of their researches, and edit a geology.

●

Adopting Nature's Children

Should teachers encourage the transplant ing of wild flowers? Is it good conservatio teaching to bring these flowers into th school to plant in an indoor rock garden Is the private individual who brings wil flowers into his garden assured that thos who come after him will care for these "adopted children" that are so dependen upon his care in maintaining living condi tions in a foreign environment? The an swers depend on two things: the importanc of these particular flowers as teaching mate rial and the ultimate result to the specie of flowers concerned. Some teachers selec for their indoor rock gardens or outdoo wild flower gardens only those flowers whic are common, and after the class has com pleted its study, these flowers are trans planted in a suitable place in the woods where they may continue to grow. Some times this return of the wild flowers to the woods is made the object of a delightful expedition and in the lower grades of the elementary school, where pupils enjoy such things, the transplanting may be accom panied with much ceremony.

●

The Black Skimmer

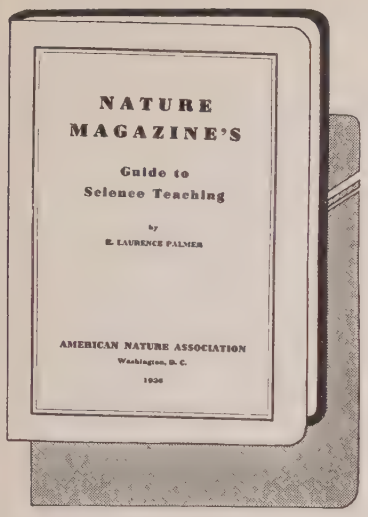
The intriguing adaptations of shore birds present problems that are within the abil ity of the elementary school pupil to solve. For instance, an outline of the bill of the black skimmer could be placed on the black board and pupils could offer opinions as to what this bird might have on its bill of fare and how this food could be obtained, using the article to verify their conclusions.

Older pupils could be referred to this article and other sources to trace the possi ble stages through which this bird may have passed in changing from the type represent ed by the young bird to that represented by the mature one, pointing out the advantages and disadvantages of its present state. They should not miss the point made by the au thor that a character once lost can not be re gained.

●

North Dakota Susie

This article tells of the heartache accompanying an attempt to make friends with some creature of the wild. This article could be read or told and then discussed in any grade in the elementary, junior or senior high school. Why was the collar taken off the deer, why was the body left? One could write a story telling how the hunter may have felt when he realized that it was the tameness of the deer and not his marksmanship that accounted for the death of the deer.



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Great Mother Forest

"Darkest Africa," a term often used by novelists and Hollywood scenario writers, is, to Commander Attilio Gatti, just another place to take an expedition. Deep in the Belgian Congo, covering many square miles of territory scarcely known to white man, lies the Kibali-Ituri forest, *tabu* to the native pygmies because of their superstitious terrors regarding it. It was into this dense wall of matted vegetation that Commander Gatti lead a recent expedition, and *Great Mother Forest* is the result of his observations and studies of both the animal life and the human inhabitants he found there. The book is immensely colorful and is illustrated with many excellent photographs taken by members of the exploring party. Commander Gatti, who has presented many collections to various museums, particularly to the Royal University of Florence, where his contributions fill twenty-two rooms, is now on his tenth African expedition. *Great Mother Forest,* published by Charles Scribner's Sons, New York, is available for $3.75.

Bird Watching Adventures

Bert Dayton, a Nature lover who has spent some thirty years afield, has written an interesting and entertaining book entitled *Adventures of a Bird Watcher.* It does not treat exclusively with birds, but with other experiences that the author has had while roaming through the woods. Deep appreciation of Nature can only come to those fortunate individuals who have been in close contact with Nature over a long period of years, but we can be thankful that there are such things as books so that this appreciation can be passed on to others. Published by the Palisade Press, this book sells for $1.50.

New Flower Book

Familiar Flowers of Field and Garden is the title of a new book by F. Schuyler Mathews, author of many books on flowers, trees and birds. This new work is a completely revised edition of the author's handbook that has been standard in its field for many years. The book has been arranged systematically, the flowers being discussed by the months in which they appear. This method enables the reader to obtain a consecutive panorama of our familiar flowers as they bloom from early spring to late fall. D. Appleton-Century Company, New York, are the publishers, and the volume is priced at $2.50.

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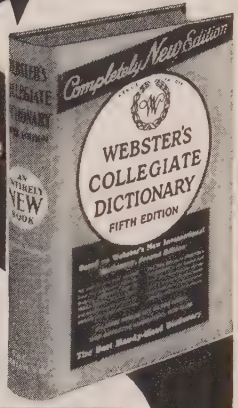

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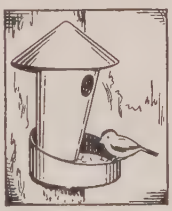

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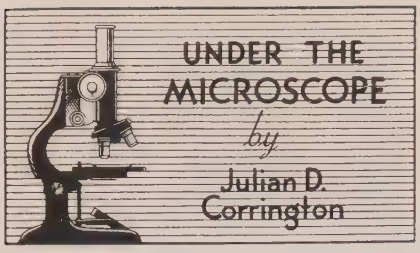

WHEN PLANTS TRAVEL

You may have run across the statement that there is no single characteristic by which a plant may be told from an animal in all cases. Strange as it appears at first thought, this assertion is true; for while the differences between a horse and a pine tree are many and obvious, the distinctions break down one by one as we approach the lower groups of the two kingdoms. Plants are fixed and rooted in one spot while animals move about freely; plants manufacture their own food, animals have to eat ready-made food; animals respond to stimuli but plants are inert, and so on.

However, there are exceptions to all of these generalized differences and their study is frequently more fascinating than that of the species which conform. One of the major topics certain to arise in this connection is that of the geographic distribution of species and the means for effecting their dispersal. Antelope and mice can spread outward from their center of population by traveling overland so as to conquer new territory as their numbers increase; birds fly to fresh sites; fish can swim, worms can crawl. The fixed sponges, hydroids and moss animals, the adults of which are attached to the ocean floor, produce swimming individuals which wander off to found new colonies at distant points. But what of plants?

Pine trees and milkweeds cannot get up and walk away from an over-crowded district and then take root again elsewhere. Nevertheless they accomplish just this result by a roundabout method—the production of embryo plants for which a means of passive travel has been provided. Fruits and seeds of nearly all the higher plants show remarkable adaptations for dispersal, and October is one of the best months for their study. So—on with the blue jeans or the slacks and ho for the autumn woods and fields, armed with a cigar box in which you have a quantity of small envelopes or pill boxes, and a pencil for writing data upon these containers.

DANDELION FRUIT, A TYPICAL FLOATER. THE SEED PROPER IS AT THE LOWER END

A MAPLE KEY, A SAILER OR WINGED FRUIT

Few people distinguish between fruits and seeds inasmuch as the definitions are quite technical. A dandelion or milkweed "seed" is actually the fruit; a cocoanut is a fruit but a Brazil nut is a seed. Some fruits contain but a single seed, as with the grain of wheat or the peach, while others house many seeds, as in the orange or tomato. However, whether we call a given object a fruit or a seed makes little difference as far as studying their dispersal is concerned.

Some plants gain new territory by means of creeping roots, underground stems called rootstocks, surface stems known as runners, broken off branches or detached buds. The majority, though, are scattered through the travels of fruits and seeds and the means employed are either active or passive.

In the former class are found instances of explosive or catapulting fruits which hurl their seeds to considerable distances from the parent plant, as in the violet, pansy, witch hazel and Jersey tea, where the drying-up fruits have certain tissues stretched to the bursting point and finally let go with relatively great force. It is said that capsules of the sand-box tree of tropical America burst open with a noise like a pistol shot.

Passive dispersal employs the carrying powers of wind, water and animals, resulting in many ingenious adaptations to secure these services. Under the heading of dispersal by wind we may distinguish between sailers, floaters and rollers, each with distinctive characteristics. The sailers comprise winged fruits, such as basswood, maple and elm, that are provided with expanded, leaf-like membranes that cause the detached fruit to descend slowly and with a twirling motion, being thus carried some distance away if a breeze is blowing. High winds serve both to detach and transport at the same time. Seeds of the pine, catalpa and trumpet creeper are similarly organized.

Floaters include those with tufts of hairs, as in dandelion, willow, milkweed or thistle. These are extremely light and will traverse long distances on even a breath of air. Rollers, such as Russian thistle and other tumbleweeds, have a rotund, bushy growth, so that when the plant dries and dies, the stem breaks near the ground and the whole goes rolling briskly over the countryside on the strong wings of autumn winds, scattering seeds throughout its course.

Dispersal by water is not as readily observed but is a common phenomenon in aquatic plants and those growing along shores. The yellow water lily has floating fruits while that of the cocoa palm has been known to drift for thousands of miles, borne by ocean currents to far distant lands. New coral islands soon receive a population of palms in this manner.

Dispersion by animals may be casual, as when seeds adhere to the mud caking the feet of birds, or when blue jays, woodpeckers and squirrels hide acorns and nuts and later forget them. There are two classes of animal transportation, however, external and internal, where the whole design of the fruit or seed is directed toward the end of securing such conveyance, and these are the most interesting of all to study. In external transportation, fruits are either provided with sticky and glandular hairs, as those of Salvia, or more commonly with hooks and barbs to catch onto the fur of passing mammals, as is done by cockleburs and sticktights.

Anyone who has had the experience of removing hundreds of these pestiferous objects from their clothing after a hike in the autumn fields, or who has tried to comb them from the ears and coat of a bird dog, or the

ONE OF THE BEGGAR'S LICE, A FRUIT WE OFTEN HAVE SCRAPED FROM OUR CLOTHING AFTER AN AUTUMNAL RAMBLE

s and legs of horses knows all too well
w effectively these fruits are designed.
nternal transportation involves some of
most ingenious of all plant adaptations
he production of succulent, appetizing,
grant and attractively colored fruits for
sole purpose of paying animals to eat
m, to digest the pulp and void the indi-
tible seeds later on in the droppings at
he distant spot. Many examples will
mptly come to mind, such as the tomato,
ch, raspberry or grape.

Among all of the interesting specimens
t can be collected to illustrate this topic,
tain ones call for study with the micro-
pe, notably the floaters among wind-dis-
outed fruits and seeds and the external
nsportation type of those disseminated by
mals. Suggested for slide mounts are:
low, poplar, cottonwood, milkweed, this-
dandelion, cotton, fleabane, arnica, wil-
-herb and anemone as examples of float-
some of which mature in spring rather
n fall, and as many as possible of differ-
kinds of those weed seeds commonly
med beggar's ticks to represent external
mal transportation. Prominent species of
latter are: bur marigold or beggar's ticks,
lens; Spanish needles, *Bidens bipinnata;*
ktights, *Hedysarum,* and others; stick-
ds, *Lappula;* tick trefoil, *Meibomia,* and
avers or goose grass, *Galium,* the last three
ng frequently known indiscriminately as
ggar's lice.

The way in which different plants of this
t classification go about obtaining the
ne results in varying fashion is intriguing.
e big burdock and cocklebur, unsuited for
le work, are more obviously though no
re efficiently provided with recurved
oks, barbs like fishhooks, saw-toothed
ands or sharp prongs than are the many
es of sticktights.

Some of these objects are relatively large
l thick and will have to be mounted in a
ression slide, a cell, or else thick balsam
st be applied a number of times, each
drying before the next is added. This
olves cover-glass props and a drying oven
other situation free from dust. When a
al application has brought the surround-
balsam up to the level of the top surface
he object, add a drop of thin balsam and
n the cover glass.

These fruits and seeds make nice dry
unts, enclosed in a cell or ring cemented
a slide, the cover glass then affixed to the
g, using one of the newer liquid cements
both cases, the cell containing air and no
unting medium at all. The only require-
nt is that the object be thoroughly dry
ore sealed in. For balsam mounts pass the
its through strong alcohol and carbol-
lene, one-half to three hours in each, as
s done with insect parts, before mounting.

TRADE NOTES

Microscopy as a hobby is much older and
re popular in England than with ourselves
d so it is not surprising to find a consider-
le library of books on the subject in the
itish bookstalls. Many of their ablest sci-
tists have not scorned to write for the lay-
n, as is apt to be the case on this side of
Atlantic. Among these the late Sir Arthur
ipley took leading rank, with his fine sense
picking out essentials, his unusual gift of
esenting them in non-technical phrasing,
facile style and saving grace of humor.
nting Under the Microscope includes fas-
ating accounts of protozoans, hydra, roti-
fers, crustacea, water mites and mosquitoes. You should have a few of these British works in your library, and this volume is certain to be enjoyed, and is available from the Macmillan Co., 60 Fifth Ave., New York City, for $2.50.

Among well-known manufacturers of optical equipment who have entered the field of producing miniature models of microscopes is the Wollensak Optical Company of Rochester, N. Y. Their products include a 150X microscope at $14.50, with a separate high-power eyepiece for $3.50 extra, and a 425X instrument at $20.00, with an additional low-power eyepiece at $3.50 extra. While miniature in size, these are scientifically constructed microscopes and not toys. Along with many other items these two instruments are described and illustrated in an attractive catalog, mailed to all who request it and send a 3c stamp to NATURE MAGAZINE.

Biology has today become such a complex web of interrelated subsciences that texts are either growing bulkier or else they omit entire chapters or treat them sketchily. It has seemed well nigh impossible to comprise the whole field within one small volume and still cover all phases adequately; yet this is exactly what has been done by that master of scientific writing, Professor James G. Needham, in *A Survey Course in General Biology,* the title of which states exactly the purpose for which the book is intended. If you want an entertaining and informational exposition of modern biology which will slip into your pocket, here it is. The Comstock Publishing Co., Ithaca, N. Y., $2.20.

A binocular microscope especially made for entomological work is the No. 56U of the Spencer Lens Co., Buffalo, N. Y., prices ranging from $125.00 up according to equipment. In addition to a splendid binocular design suitable for any form of work with this type of instrument, the No. 56U has separate features designed by Dr. A. L. Melander of C. C. N. Y.,—an adjustable lamp for overhead illumination and a focusing object carrier of cork for the examination of pinned insect specimens in any position. This carrier would serve equally well for the examination of fruits and seeds too bulky for slide mounts, as maple keys and cockleburs. Write to Spencer for booklet M-55 if interested.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

Sincerely,
JULIAN D. CORRINGTON.

Museum Murals

The Field Museum of Natural History of Chicago, believing it desirable to introduce into the botanical exhibits habitat scenes showing plants in their natural environment on a more adequate scale than by photographs, has enlisted the services of Charles A. Corwin, their staff artist, to paint a series of murals for the Hall of Plant Life. Three already have been completed, and illustrate the dragon blood tree of the Canary Islands, the monkey bread tree of Central Africa and the giant cactuses of Mexico.

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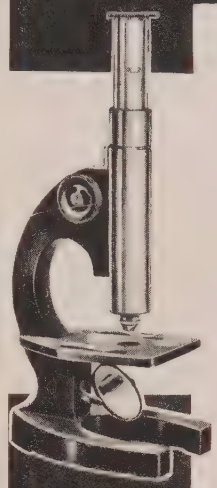

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FLOWERING BULBS OFTEN OVERLOOKED

(Continued from page 244)

while many nurseries handle our eastern ones.

The American lilies make up quite a sizeable group, although you may have to experiment to find the proper location for some of them. As mentioned in a previous article, seed of practically all of these is offered in case you do not wish to purchase bulbs.

Those who live in the more temperate sections where winter temperatures do not go much below zero might well try the Easter lily. Many of these will be hardy, provided you plant only healthy bulbs. You can often buy these reasonably from your florist after he has used the flowers.

And so we might keep on indefinitely, but I have limited my suggestions to those bulbs you will be able to purchase from the large bulb dealers if not many of the smaller ones. If you wish to venture farther into bulbs may I again recommend that delightful book by Louise Beebe Wilder, *Adventures with Hardy Bulbs*.

ADOPTING NATURE'S CHILDREN

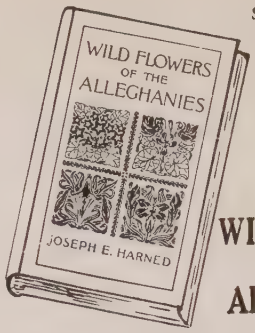
(Continued from page 213)

as they would in an open meadow. First the two wild irises came up and blossomed, then three rose pogonias appeared, much to my delight, for I had not known they were there. They blossomed just after I had found an *Arethusa* and put her in the tub. The pitcher plant that I had brought up from the swamp grew even more luxuriantly than where it had been, producing five perfect blossoms and many large pitchers with scarlet veins and hairy edges. These shared the larder with the round-leaved and spatulate-leaved sundews that I found in the grass around the old swimming-hole down in Nutter's pasture. A crested shield fern came up and vied in height with the iris leaves, while a meadowsweet and a shrub of *Cassandra* threatened to drive everything else over the edge into the dry places.

One day while on a drive up country I found the handsome blue *Mimulus* or monkey flower, growing at the edge of a running brook, and with it the purple vervain, both with their feet in the water. I took them home and placed them in the bog garden, and both continued to bloom quite undisturbed, and even ripened and shed their seed. Besides these tall plants all sorts of creeping, low things appeared from time to time: bronzy Cape Cod cranberry vines, and little blueberry bushes, and finally, this fall, a blue fringed gentian! It had half a dozen blossoms, and as they faded and went to seed where every tiny seedling, as it comes up, will be cherished and watched to maturity, it seemed to me that this was true conservation—"a keeping in a safe or entire state."

Michigan Reports

The July issue of the *Jack-Pine Warbler*, official bulletin of the Michigan Audubon Society, contains, besides the annual reports of the officers of the Society, a worth-while article on *How Bad is the Crow?* The bulletin is available from the Society at Grand Rapids, Michigan.



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Diana Thorne's DOG COLUMN

THERE WERE three parts to all Gaul according to Cæsar's survey. By the same token three animals figure in literature since the beginning of record as heroes (and heroines) in their devotion to the service of man—the dog, the cat, and the horse. I put them in this order merely because herein I happen at the moment to be concerned with the dog. Disliking argument that has no end and less reason or profit, I leave to those who care as to which of the three may be accorded highest points in the competition through the ages.

Today the daily newspaper frequently records some gallant and self-sacrificing act by a dog or a cat. The horse, save in racing circles, is diminishing in number.

Much color has gone out of life. Had they "carried the good news from Ghent to Aix" by telegraph, or aeroplane, or automobile, a great poet would have been deprived of material and *motif* for the creation of a masterpiece. And, thinking of Browning, I think of "Flush," the cocker spaniel, who was the patient, sympathetic and constant companion of the invalid Elizabeth Barrett through the long period of her sickness. This was the one creature in a sorry household to give forth joy and hope and understanding and devotion; the one simple, happy and fearless mind in a gloomy British congregation.

The romance of Elizabeth Barrett and Robert Browning, which was dramatized a few years ago into a popular play and acted so excellently both on the stage and the screen, had in its cast a spaniel who took the part of "Flush," the beloved, and who did very well in the role.

A dog or a cat on the stage as an active member of the cast is an uncertain quantity and one to be avoided by the playwright. But "Flush" was a good actor! He never missed a cue or stole a scene. I think of him as I draw a cocker spaniel today. On a non-matinee afternoon during the run of the play he came to my studio and sat stolidly and attentively for his portrait. His somewhat obvious lack of humor on that occasion I attributed to the blinding effect of limelight and an engrossing sense of self-importance.

The spaniel may not have cousins whom he "reckons by the dozens" but he has many kin in his family. There is a certain similarity in the appearance of the Bleinheim, the Clumber, the Sussex and the Springers (a haughty branch of the tree), and the Cocker—but to the spaniel enthusiasts and expert there are vast and numerable differences.

The spaniel has a remote ancestry. He originated in Spain, according to the general belief; hence his name. Just how in course of time and experiment the various subdivisions came about is not of clear record. No canine genealogist, so far as I know, has gone exhaustively into the matter.

Certainly the spaniel more than any other dog found himself the theme and inspiration of much poetry in the seventeenth and eighteenth centuries. Shakespeare, Herrick and Somerville particularly saw in him and his engaging ways material for much that was delightful.

The popularity of the breed is demonstrated by the fact that the largest entry of any class at the recent Westminster Kennel Club show was that of spaniels.

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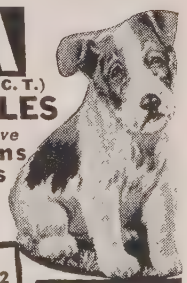

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Bugs, Birds and Blizzards

Do not be misled by the alliterative title assigned to Harlow B. Mills' *Bugs, Birds and Blizzards in the Yellowstone*. It is true that the 80-page booklet does discuss the avian and insect life, and the rigorous winters of Yellowstone Park, but it is anything but a scientific discussion. Mr. Mills, a former Park Naturalist and now assistant State Entomologist of Montana, with his fine descriptive writing, creates in the reader a distinct travel urge, and what is more, a reader who has visited Yellowstone will want to go again to see what he has missed. Although not specially emphasized in his book, it appears that Mr. Mills is an ardent conservationist. On several occasions he deplores the disappearance of the trumpeter swan and other wildlife forms, and urges that steps be taken to increase their numbers. Because Mr. Mills knows Yellowstone as you know your own neighborhood, because he understands Nature and is adept at describing her beauties on the printed page, we would suggest, if you can't make the trip yourself, that you read this booklet. It is the next best thing. Collegiate Press, Inc., Ames, Iowa, is the publisher, and the book retails for fifty cents.

California Fur-Bearers

Two volumes that will be welcomed to a permanent place in the library of the zoologist, the Nature student and all those interested in the subject in general are *Fur-Bearing Mammals of California,* by Joseph Grinnell, Joseph S. Dixon and Jean M. Linsdale. The volumes concern themselves with the mammals' natural history, systematic status and relationship to man, are completely illustrated and contain several colored plates by Major Allan Brooks. Description, measurements and distribution in California are given for each animal, and a generous amount of text tells of its history and observed behavior. The two volumes, a contribution from the Museum of Vertebrate Zoology, University of California, are available from the University of California Press at Berkeley for $15.00.

Correspond?

Miss Myrtle Ridgely, of 2733 Third Avenue North, Seattle, Washington, has been a Nature lover and a reader of NATURE MAGAZINE for many years. In a recent letter to us she asked us to make known the fact that she desires to correspond and exchange information with other Nature lovers whose age is around forty years.

Quail Sprinter

Ranger Lon Garrison reports in the August issue of *Yosemite Nature Notes* that he paced a mountain quail in a Government patrol car at 25 miles per hour. The bird, which elected to stay in front of the car rather than wing off into the brush at the side of the road, was clocked at 15 miles per hour as he ran down the road before taking flight. *Yosemite Nature Notes* can be obtained from the Yosemite Naturalist Department, Yosemite Park, California.

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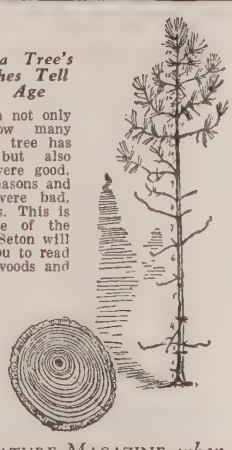

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Photographic Notes

BY SAMUEL BROWN

Night Photography

An unusual phase of photography, and without doubt one of the most interesting, is picture taking at night. Here the amateur has an opportunity to display real originality. The scope of night photography is extremely great, presenting as it does such subjects as architectural studies by moonlight and artificial light, pictures at the campfire, theatre photography, lightning, fireworks, and, most common, indoor portraiture at night. This month we shall discuss some of these subjects and suggest the proper methods for making pictures after sunset.

The first important consideration is the equipment. Surprisingly enough, any camera, even the box, providing it is possible to make time exposures with it, will be satisfactory. The faster the lens of course, the shorter will be the exposures required. With lenses rated at F.4.5 or faster it will be possible, in some cases, to take snapshots outdoors when the subject is well lighted, as, for example, a street with many electric signs. For inanimate objects, where speed is not essential, any camera may be used to good advantage.

In night photography it is best to use panchromatic films at all times, preferably the super sensitive type, so that the greatest advantage may be taken of the available light.

Because of the varying conditions under which night pictures may be taken, it is impossible to give exposure data with any degree of accuracy. This is merely a matter of guesswork, but after several trials the photographer will find that he can achieve good results on an average, determining correct exposures by results obtained in previous trials. One advantage is that conditions are constant, especially with artificial light, from one night to the next. When working with the moon as the only source of illumination, the exposure may be calculated as requiring twenty-five minutes for each 1/100th of a second required during the day. For example, if a certain scene in good sunlight would require 1/100th of a second at F.11 during the day, the same scene at night with a full moon would require 25 minutes at F.11 or 12½ minutes at F.8. The time could be cut to six minutes at F.5.6. With a half moon the above suggested exposures should be multiplied by four.

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"TIMES SQUARE." TAKEN WITH A GRAFLEX ON PANATOMIC FILM, 1/30TH SECOND AT F.3.5.

One of the most interesting subjects is a well illuminated street such as is found in practically every big city. After dark, when the electric signs are turned on, a snapshot may be taken with a fast enough lens. At F.3.5, using super-sensitive panchromatic film, an exposure of 1/25th of a second is generally sufficient, while with films such as Super-X a stop of F.4.5 may be used. It is advisable, however, to use a fast shutter speed rather than a small lens opening and longer exposure. In this manner it is possible to stop the motion of moving automobiles. Otherwise headlights would affect the film and leave a white streak in the print. If detail is required in buildings and in the streets, in addition to the signs and brightly lit sections, two to four times the exposure recommended above will be necessary.

Lightning makes an interesting subject and is easily photographed. Merely set the camera on a tripod close to an open window in the direction of the last several flashes. The lens should be set at a medium stop—F.6.3 to F.9—and the shutter opened. As the flashes occur they will register themselves on the sensitive surface, making their own picture. An odd effect is obtained when the shutter is left open for two or three flashes.

At night it is necessary to exercise a few precautions, particularly as regards the camera. On foggy nights it is quite likely that some moisture will settle on the lens. This should be carefully wiped off with lens tissue before any exposures are made. Failure to do so will result in a blurred, foggy image. Since many night pictures will be taken shooting either directly or almost so into the lights, a lens shade of some kind should always be used. Negatives taken after dark tend to be too full of contrast and should therefore be developed in a soft developer such as Eastman's formula D-76.

We have shown here a few of the possibilities with a camera after the lights are turned on. This fascinating phase of photography offers unlimited possibilities and this writer would like to know if his readers want more articles of this kind. Drop a line to this department and let us have your suggestions and opinion.

Exposure

Last month we discussed briefly the various factors that enter into exposure. Each of these must bear important consideration before the shutter is snapped. This month we take up the matter of proper shutter speeds and diaphragm settings.

Shutter speed is of prime importance when taking moving objects. The question that comes up first is how far the image will move on the film while the shutter is open. Naturally this should be as short a distance as possible to get sharp results. For pictures of ordinary subjects such as animals and human figures that are not moving or moving slowly, exposures of 1/25th to 1/100th of a second may be used. Moderately moving subjects such as animals in motion, children at play and slow moving vehicles may be stopped with shutter speeds of from 1/100th to 1/300th of a second. Fast moving objects such as automobiles and birds or athletes in the sports arena will require shutter speeds up to possibly 1/1000th of a second in order to stop the action.

In determining shutter speeds for moving objects it is also necessary to consider the distance from camera to subject and the angle of view. At a great distance an object appears small on the film. Its movement is correspondingly smaller and thus a longer exposure may be used at a greater distance. For example, if a certain object at twenty-five feet requires 1/100th of a second to arrest all motion, at fifty feet the same object could be stopped at 1/50th of a second.

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from the camera can be stopped quite easily with a comparatively long exposure because the motion is practically negligible on the film. When the movement is at an angle the motion on the film takes a slight side movement which will show if a fairly fast speed is not used. Objects moving directly across the line of vision will require an extremely fast shutter speed because motion is definitely from side to side. The lens aperture is set after the necessary shutter speed is determined.

With inanimate objects such as scenery or still life, there is little or no problem because the subjects are stationary. Here, however, we have the problem of overall sharpness. It is well known that a small stop opening gives the greatest depth of focus which is to be desired in most cases. We must also consider the focal length of the lens in this connection since the longer focal length lens has less depth of focus than the shorter. It should also be remembered that the closer one works to the subject the less will be the depth of focus.

At times it is desirable to have less depth of focus as in the case of still life. If we are photographing a bunch of flowers in a vase against a background of figured wall paper, it will be found that by stopping down the lens, the wall decoration will be rendered sharply and its details will detract from the main subject. In this particular case it is best to stop down only sufficiently to bring the main subject into sharp focus and leave everything surrounding it showing in a hazy rendition. We learn, therefore, that just the opposite of moving objects, it is best in photographing still subjects to set the lens aperture first and then the shutter speed accordingly.

Trade Hints and New Books

At Home With Your Kodak is an unusually interesting booklet of 32 pages outlining many ways in which to make pictures in and about the home. Especially welcome will be the portions devoted to indoor portraiture, in the grounds and photographing pets. Please send a two cent stamp for your copy.

The Eastman Kodak Co., Rochester, N. Y. this month sends us news of unusual interest. This company has recently introduced a new service which will be known as The Camera Club Photographic Service. Its function will be to supply material and literature on how to organize and conduct a photographic club. In addition, it will supply prepared lectures on different phases of photography. Many interesting titles appear on the list sent this department. This service will be entirely without charge and promises to be quite helpful.

E. Leitz, 730 Fifth Ave., New York, N. Y. announces that it is now possible to purchase Leica cameras and equipment on the time payment plan. This makes it possible for amateurs who were unable to own this equipment because of the high outlay to

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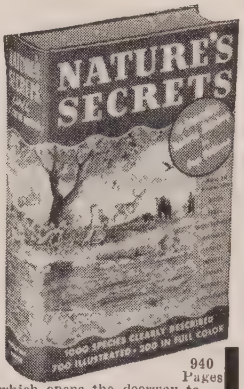

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The twenty-third edition of *How To Make Good Pictures* is now available. This writer becomes more enthusiastic with each new edition of this book. Being the photographic best seller for many years, the new edition is more attractive than ever. Up to date in every respect, there are details of Kodachrome and Infra-Red photography. New chapters include Stunt Photography and Flower Photography and new details have been added to the chapters on night photography, indoor portraiture, composition and many more. At fifty cents this book still remains at the head of our "must" list.

The photographic department of NATURE MAGAZINE is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic matter. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

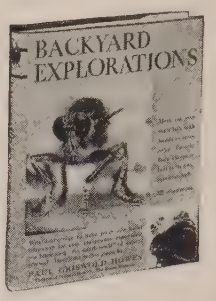
Cordially,
Samuel Brown

Vitamins

Hugh White of New Hartford, New York, puts in his spare time building bird houses and watching his avian tenants. A pair of wrens were among these. Successfully raising a family, the mother wren was observed with a youngster that had just learned to fly but was taking time out on a limb. The mother flew to the hen house roof, caught a moth about an inch long and carefully removed both wings. With the remainder she flew to the offspring with a good meal. Apparently there are no vitamins in wings and the mother wren knew it.

Panamanian Animals

Ornithologists and mammalogists will find *The Birds and Mammals of the Western Slope of the Azuero Peninsula* a valuable addition to wildlife data. It is the work of John Warren Aldrich and Benjamin Patterson Bole, Jr., and is Volume Seven of the scientific publications of the Cleveland Museum of Natural History. The book deals with a little known part of Central America, and is based on the expedition of the two authors and data assembled by previous expeditions.



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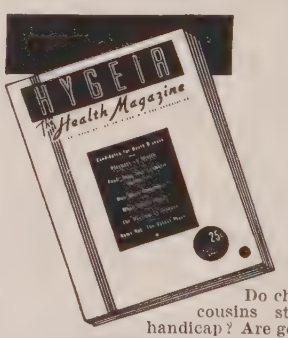

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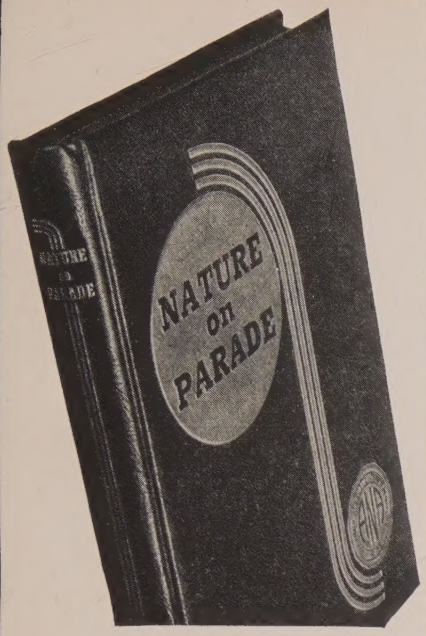

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Meet Our Authors

We welcome back to the pages of NATURE MAGAZINE **John Lindsey Blackford**, a young Montana naturalist and writer who recalls some of the interesting experiences he has had while tramping through the woods near his home.

Hamilton M. Laing is a Canadian naturalist and photographer who lives in British Columbia.

John Willard Baechle, a young Catholic priest, carried on his studies of the polyphemus moth, about which he writes in this issue, at the Catholic University of America in Washington, D. C.

Tony Lascelles is the pen name of H. U. Green, of Canada, widely known as a writer on outdoor subjects, and as a conservationist.

Bessie M. Lindsey, of Forsyth, Illinois, names, as her special interests, home, old American glassware, photography, Nature and people. At one time she specialized in radiology at Mercy Hospital, Chicago, and served as first assistant to the director of the X-ray department at that institution.

Stephen Haweis, artist and writer, is a resident of Dominica, British West Indies. He writes with a forceful philosophy and a sense of humor.

Edward A. Preble, Associate Editor of NATURE MAGAZINE, bases his story on the mountain heronry on a boyhood experience in New Hampshire.

Joseph C. Galloway, escaping from his duties at the Eden Nurseries at Port Allegany, Pennsylvania, for a few weeks, found southern Florida a veritable Nature lover's paradise. It was at Punta Gorda that he had his interesting experience with the gobies.

Otto Diemer is connected with an advertising agency at Dayton, Ohio. His appreciation of Nature is apparent in his story, *The Leaf*.

Betty Hone, a niece of Naturalist Vernon Bailey, was formerly assistant secretary of the American Committee for International Wild Life Protection. She is actively interested in Nature, and teaches school at Lyons Falls, New York.

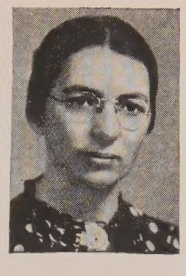
Louise Laird teaches school at Barrington, Illinois, and bases her article on an actual experience with the vivarium located in her classroom.

Meet the Phytohormones

Biologists and plant physiologists will find much of interest in the book *Phytohormones* by F. W. Went and Kenneth V. Thimann. This volume is one in the series of Experimental Biology Monographs being brought out by the Macmillan Company. In this book the facts on phytohormones and their relation to plant physiology are assembled, together with the history of research and discussion of the practical application of this knowledge to plant growth. This is, of course, a technical work of highly specialized interest. The book lists at four dollars.

Amendment

In our review of *Adventures of a Bird Watcher* by Bert Dayton, we neglected to provide the address of the publisher. It is the Palisade Press, 280 Broadway, New York City. The price, if you have forgotten, is $1.50.



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Indoors and Out

By HOWARD ZAHNISER

IN THE more northern parts of this temperate zone—where my own indelible adolescent impressions were received—November is usually the last month of the year when the rattling kingfisher can be seen going its diligent but agitated way up and down the streams. The hillsides may still be in their many-colored coats of autumn or perhaps in their new winter garb of black and white. A few waterfowl may be tarrying a while on their way south, and on the stream banks one may stand in November and watch swollen waters as well as birds heading southwards. (It has always seemed a curious thing to me that a river could flow any way but southward, a phenomenon equal in credibility to that other adult-learned fact that the South Pole is cold rather than unendurably hot.)

Certainly November is an interesting season along the river, though it would be wrong to imply that there is any poor time to visit a river—or any best time either, for that matter. One can never tell. My wife and I chose June this year for a canoe journey down the Allegheny River, because in June we could do what we pleased. I regretted at the outset that our canoe trip must be so late in the season, for I thought that in many places the river would be too shallow. There were floods instead, and in many places where I had expected portages we found ourselves shooting rapids!

Now in another way I have November before me, and I see no reason why this too may not be a good time for rivers. There are, on the other hand, at least two good indications that November indoors this year should prove to be an excellent month for rivers: *Thames Portrait,* by E. Arnot Robertson, with photographs by H. E. Turner (Macmillan, $4), and *Concord River, Selections from the Journals of William Brewster,* edited by Smith O. Dexter and illustrated by Frank W. Benson (Harvard University Press, $3.50). And I would add to these another just-published book, *The Collected Poems of Sara Teasdale* (Macmillan, $2.50).

There are at least three ways that I know of to enjoy rivers. One can seek the source and follow the stream to its mouth. That was the way Miss Robertson and her photographer husband gathered the material for their *Thames Portrait.* William Brewster's *Concord River* tells little of headwaters or outlet, but its author had come to know as a confidential friend about all that there was to know of one stretch of that stream. I have to a certain extent known the Allegheny River in both these ways, and I could hardly tell which sort of knowledge I prize more highly. Other rivers I have known principally as meandering lines on maps, myriads of them making their ways in surprisingly many directions to larger streams, to lakes, or eventually to the seas and oceans—streams in imagined valleys, the stuff of which poetry and symbols are made. This is the understanding of rivers that Sara Teasdale wrote into her poems, one volume of which (published in 1915) was even entitled *Rivers to the Sea.*

"Spend all you have for loveliness," Miss Teasdale counseled in "Barter", her best known poem, and taking her own counsel she acquired much loveliness and has bequeathed it to her readers—not as one *describing* lovely things but as one expressing the subtle ways in which a sensitive spirit is affected by, and finds human significance in, life, the sea, rivers, hills, birds, trees, flowers, and seasons.

I love too much; I am a river
Surging with spring that seeks the sea.

But her incidental descriptions are often delightfully effective, as in "A November Night" she writes:

How cold it is! Even the lights are cold;
They have put shawls of fog around them, see!

Though Sara Teasdale sang mostly from her own heart and after that from the hearts of women, feeling most intimate with those rare persons who like herself combined the two highest orders of creation, being both woman and poet, her collected poems are certainly a welcome addition to a nature library, however exclusive such a library may be. If one thinks of rivers and November, he finds richness in the volume, but he would have similar success in satisfying a dozen other interests. For of the book one might say what Miss Teasdale sings in the closing verses of "A Winter Bluejay":

Oh who can tell the range of joy
Or set the bounds of beauty?

The Harvard University Press seems to have found difficulty in setting another sort of bounds, for *Concord River* is apparently the result of a kind of mistake that publishers must take great delight in discovering among their own acts. The publishers of *October Farm* set too narrow bounds in their estimate of reader interest in William Brewster's journals, and now after reprinting the earlier book they are offering a "sequel" of further selections. These new selections are from the same pages of the journal, other patches from the same quilt that, if this sort of thing keeps up, readers may soon be able to piece together again completely, and I hope they will. With the exception of Frank W. Benson's generous artistic contribution, which includes such subjects as crows mobbing an owl, a wedge of Canada geese, and chickadees, the volume seems to me much as I described *October Farm* in July. Perhaps it is enough here to point out that *Concord River* includes such new selections as the following, from the journal of November 20, 1897:

"The whole country was beautiful beyond description in its robe of spotless white. The effect of the snow on the trees was unusual. They were not loaded down with masses of snow, as is usually the case, but each twig and branch was merely 'picked out', as it were, in white. The pines were especially beautiful, the snow clinging about the bases of each cluster of needles, leaving the tips exposed. The effect of the grasses and stalks was most delicate of all. But most interesting (Continued on page 309)

"AT LAST THE FAWN, DROPPING ITS HEAD, NIBBLED AT THE SPARSE GRASS"